

# FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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## Flight.

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## EDITORIAL COMMENT.



HAT is the meaning of the Order issued by the Ministry of Munitions, forbidding the construction of experimental aeroplanes? This Order, the full text of which we publish on another page of the present issue of "FLIGHT," prohibits not only the actual construction of aircraft, but even the preparation of working drawings, except under licence from the Ministry. What

The Ministry of Munitions and a Monopoly. it all means we are entirely at a loss to imagine, unless there is something sinister at the back of it. To our way of thinking, there are but two possible explanations of a course of action which, to say the least, appears to be most extraordinary. The one is that the Ministry has been guilty of a piece of pure fatuity, but that assumption, after examination, will not hold water. The other is that it is the intention to stop all private research and experiment, placing thereby the individuals and firms at present engaged in the aircraft industry in the position of mere hirelings of the Department, and thus creating a monopoly for the Government-designed machine. As the order reads it means that, if it means anything at all. It is said that "the order is not intended to prevent and discourage the design of new machines, but only to prevent useless expenditure of labour and materials upon designs and machines which have no

prospect of success. The Department desires to give every possible encouragement to original design, and no obstacle will be placed in the way of any persons where there is any reasonable likelihood of their being able to produce a useful design."

If that is so, then the Order appears to be entirely superfluous. Moreover, who is to be the judge of whether designs or machines "have no prospect of success"? As it stands the Order is open to the construction that henceforth such firms as the Sopwith, the Avro, the Short, the Bristol and a score of others who have rendered inestimable service to the cause of aviation and have helped immeasurably in the development of the modern aeroplane, are to have a period put to their valuable experimental work. Everything is to stagnate at the bidding of a Government Department which has it in its power to create a monopoly of design. It is true that the terms of the Order leave it open to the Ministry to grant licences to all or any of these firms to carry out experimental work, but a long acquaintance with departmental manners and customs has made us very sceptical of the intentions of officialdom when it sets out to arrogate to itself powers like those assumed by the Ministry of Munitions under the Order in question. There is always some *arrière pensée* in these matters, and the more we regard this present example the less we like it. Unless it is the intention of the Ministry to create the monopoly we suggest, where lies the necessity for the restriction? It is not that we have arrived at such virtual finality of design that there is no need to waste time on further experiment. On the contrary, experiment is productive of almost daily improvement in the design and efficiency of the aeroplane. Does the Ministry of Munitions, or the Air Board, or whoever is responsible initially for the drafting of the Order, intend to assure the country that the designs of the R.A.F. are so vastly superior to those evolved by the private constructors, or that it has such a monopoly of brains at Farnborough, that the experiments of others are valueless? We know there is virtually no limit to the self-complacency of the official mind, but in this case it may be as well to remind the Ministry that the machines which have been produced from the R.A.F. designs have not *always* been those which have inspired the most confidence among the men who have had to fly them at the Front and at home. And that is stating the case quite temperately.

Is Germany, we wonder, similarly discouraging all experiment directed towards securing and main-

taining aerial supremacy? We are not among those who hold and profess an overpowering admiration for German methods of organisation, but we dare venture the opinion that nothing quite so apparently fatuous would emanate from the direction of the German air service as this latest effort of Whitehall Place. On the contrary, it is reasonable to suppose that the enemy is encouraging by every means in his power the development and improvement of his aerial services. That he has gone to the length of practically prohibiting improvement we should utterly refuse to believe. Admittedly, we are in the dark as to the official construction of the reasons which lie behind the Order, and are thus driven to place our own construction upon its terms. It may be a wholly beneficent measure, but it certainly does not bear that aspect. If there is something behind it which supplies good and valid reason for what appears a most arbitrary and uncalled for action, then let the Ministry say what it is. We are all getting more than a little tired of "dictation" and "control," with no reason given—these bureaucratic methods are getting on our nerves.

**Aircraft  
Casualties  
at Home  
and Abroad.**

It is surely time that a Committee was appointed to enquire into the reasons for the present rate of wastage in the R.F.C., not only at the Front but in England. A certain proportion of loss is inevitable, and much as we must deplore the death of the gallant men who form the personnel of our Flying Services, we have to take our account with the risks of both war and peace flying. It is evident from a study of the *communiqués* that we are suffering heavier losses than the enemy, and it is equally evident that we cannot go on in this way without at least endeavouring to get at the root cause and to evolve a remedy, if it is at all possible. It is due to the men who risk their lives, and it is due also to the Air Board itself and the administration of the R.F.C. that such an enquiry should be instituted without a moment's delay.

It is the more necessary because of the statements that are being made, both in and out of Parliament, relative to the causes of the high mortality rate. It is insisted upon that our men are given machines to fly that are hopelessly inferior to those of the enemy, both in speed and climbing capacity, when much superior machines might be available. Clearly that is either the case or it is not. If the former, then someone, whoever he or they may be, ought to be branded for it. If the latter, then the sooner the mischievous *canard* is put to rest the better for all concerned. Again, it is alleged once more that our most up-to-date machines are being flown at the Front by comparatively inexperienced pilots, while the men who have been fighting in the air for many months are left to fly the older and slower machines. If that is so, it certainly argues faulty administration somewhere, and reorganisation is urgently needed. Whatever the causes and whoever is to blame for them—assuming that they do not arise out of circumstances beyond human control—it is very evident that there is a real cause for enquiry. Public opinion is becoming gravely disquieted on account of the appalling tale of losses in the Flying Services, and the public desires to know the truth. Such an enquiry as we suggest would not only have the effect

of laying bare the reasons for the tremendous jump in the percentage of aerial losses, with the consequent inevitable improvement that would follow, but it ought, once and for all, to put an end to the often obscure and unfounded charges that are brought against the administrative heads of the Air Services. The opportunity would be given for the accusers to come forward and either substantiate those charges—in which case there would be a ruthless "com-bout"—or else thereafter to hold their peace. At any rate, we might get to know the truth.

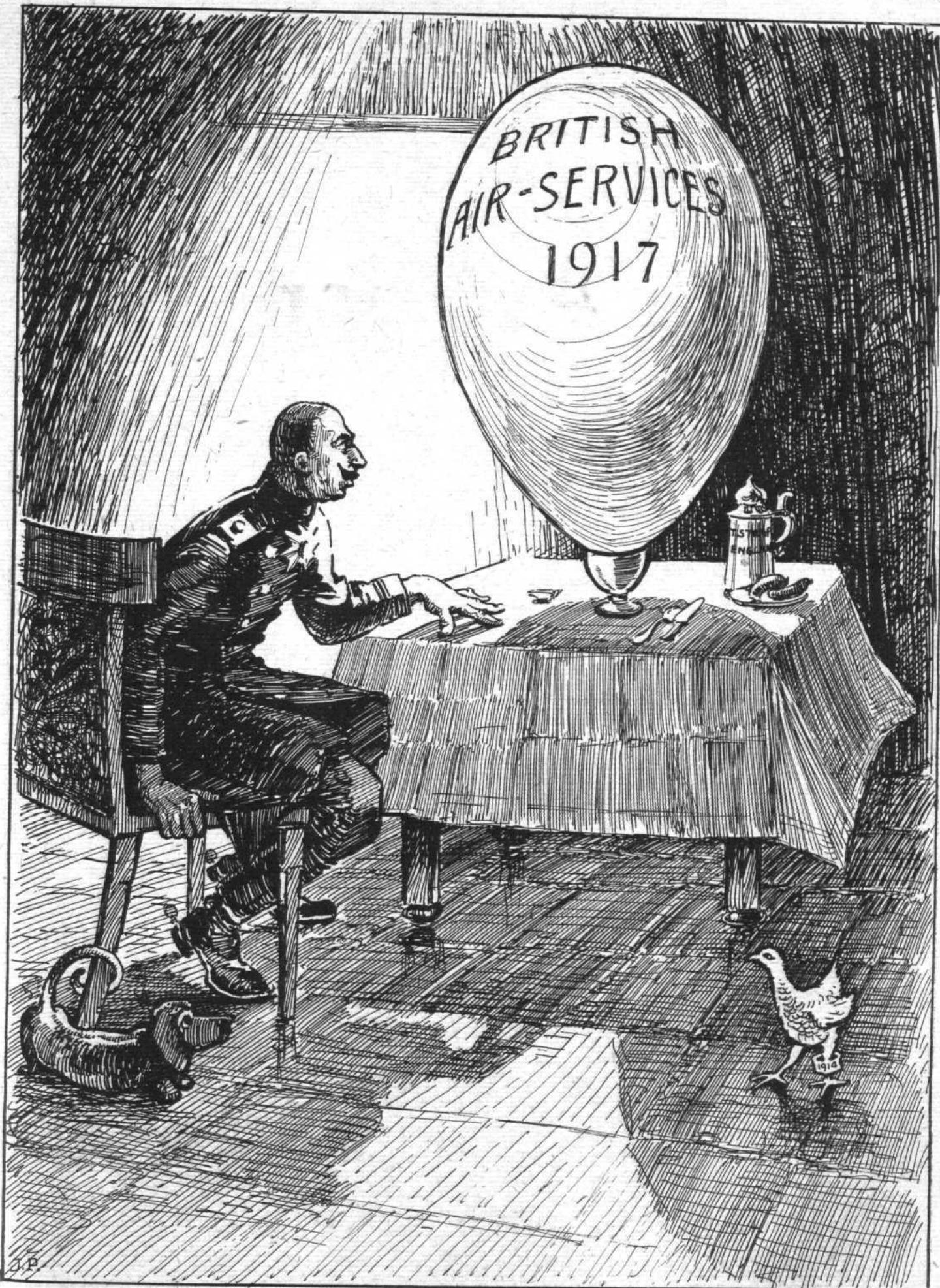
**Promotion  
in the  
Army.**

It is to be hoped that Mr. Winston Churchill's Committee which has been appointed to consider the question of promotion in the army will lose no time in getting to work, for the manner in which the promotion of officers is being worked under the entirely obsolete regulations affecting it, is becoming something very much akin to a serious injustice. Generally speaking, the sure and certain way for an officer to miss promotion is to be sent abroad on active service. He may go out in January, for example, as a second lieutenant and return home in December still with the same rank. When he reports to his dépôt he will find that men whom he left a year before junior to himself and who have never been out of the country will have become captains in the meantime. He may, for efficient service in the field, have been made acting captain and have commanded a company in the trenches, but the moment he leaves his battalion at the front he must revert to his army rank of second lieutenant and pass under the command of men actually junior in the service to himself and who have never seen a day's active service. It scarcely needs pointing out that this is a manifest injustice, which for the good of the service itself must be removed without a moment's more delay than can be helped. The whole system of promotion and relative rank wants overhauling drastically and bringing into line with modern needs and conditions. The system which worked very well in the times of piping peace is obviously unsuited to the conditions of a great war. Apart from the gross injustice which is entailed, it is clearly against the best interests of the service that officers should be left to labour under a sense of injustice which so admittedly rests on a real basis.

**Reprisals  
for  
Outrage.**

It is with the utmost satisfaction that we regard the announcement that measures of reprisal are to be taken against the Germans for the sinking of the hospital ship "Asturias." That satisfaction is tempered, however, with a feeling of disappointment that nothing has been allowed to be known as yet what form the reprisals are to take. We sincerely trust that the Government does not intend to adopt the short-sighted policy which has been advocated of placing prisoners of war of high rank on board hospital ships. That would simply defeat its own object, because the commanders of German submarines would merely have to board these vessels, take off their own people and then sink them at their leisure.

To our way of thinking there is only one method of reprisal that is likely to prove at all effective, and that is a policy of air raids on German towns—not spasmodic, as they have been hitherto, but heavy and regular until the Hun has been brought to see



An Easter Egg for "Kultur."

Kaiser Wilhelm *log.* : Himmel, what an egg for such a "contemptible little Hen" to lay !

that indiscriminate murder does not pay, because it is a game that two can play at. We agree that it is deplorable that we should be brought to the pass when we are compelled to discuss in cold blood the doing of things that revolt against every finer feeling. We are no more in love with the idea of killing civilians in their beds than we have ever been, but we are compelled by German "frightfulness" to the realisation that our own must come first, no matter to what lengths we may have to proceed for their protection. There is no question but that the only way to meet and defeat this "frightfulness" is by its like. If the Hun murders our civilians ashore and

at sea, torpedoes our hospital ships, and descends to every species of outrage in his mad effort to bring us to our knees, then, however distasteful it may be, we must in self-defence meet like with like. We have been forced to do a great many things in this war which we should never have dreamed of doing had the Germans not forced our hands by their dirty tactics. The use of poison gas and liquid fire are cases in point. Having gone so far, we cannot afford to boggle at a comparative trifle like the killing of a few hundreds of the Kaiser's subjects—the time has come when we have to take the gloves off in real earnest.

## ■ ■ ■ EXPERIMENTAL MANUFACTURE OF AEROPLANES.

THE Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Regulations and all other powers enabling him, hereby has issued the following orders:—

(1) On and after the 1st day of April, 1917, no person shall, without a licence from the Minister of Munitions, commence or proceed with the experimental manufacture of any aeroplane or seaplane or any part thereof other than any kind of aero engine. Provided that where a first application for a licence under this Order shall have been made and is pending for the carrying on of any experimental manufacture which shall have been commenced before the said 1st day of April, 1917, nothing in this Order shall prohibit the carrying on of such manufacture until the licence shall have been refused.

(2) For the purpose of this Order the term experimental manufacture shall mean any manufacture which is not under or for the direct purpose of fulfilling a Government contract, and shall include the preparation of any working drawings but not the preparation of general arrangement drawings.

(3) All persons desirous of obtaining licences to commence or carry on any such experimental manufacture as aforesaid shall apply in writing to the Controller of Aeronautical Supplies, Air Board Office, London, W.C., for such licence, and shall give full particulars of the manufacture for which the licence is required, and such further information as the Controller may require, and shall comply with any restrictions or conditions subject to which the grant of such licence may be made.

### ■ ■ ■ Two Further Aeroplanes from Malaya.

THE Secretary of State for the Colonies announces that an additional sum of £4,500 has been collected in the Malay Peninsula through the agency of Mr. C. Alma Baker, of Kinta,

Perak, for the purchase of two aeroplanes for the use of the Royal Flying Corps, which will be named "Malaya No. 31, The Kuala Kangsar," and "Malaya No. 32, The A. N. Kenion."



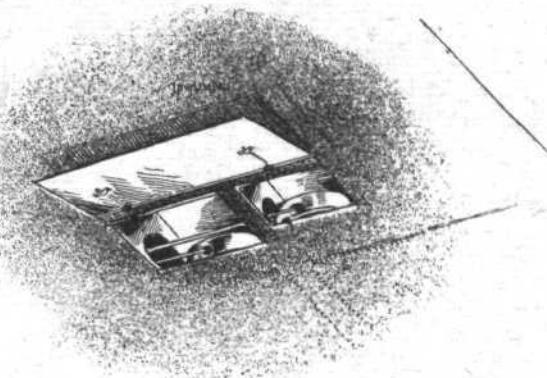
THE UNITED STATES AVIATION SCHOOL AT SAN DIEGO, CAL.—A general view.

## THE 1916 HALBERSTADT BIPLANE.

THE 1916 Halberstadt fighting biplane—one of Hunland's crack machines, of which much was heard during the latter part of last year—has general details which are interesting from the constructional point of view. Unfortunately, the condition of the one we have been able to inspect, as may be seen from the accompanying photographs, was such that lack of detail in certain parts did not allow of scale drawings being prepared. Sketches of many details, together with the drawing of the complete machine—reconstructed from the "wreckage" and from particulars of a similar model captured more or less intact—will for the time being suffice to give a general impression of this machine.

Prior to the war the Halberstädter Flugzeugwerke was known as the Deutsche Bristol Works, when Taubes and Bristol Prier-type monoplanes were manufactured. During 1915 the new firm built a speedy biplane scout, having a Morane-Saulnier-type

which differed from the previous type in several respects, mainly in the arrangement of the planes and the installation of a stationary engine. Variations of this type have, we understand, been turned out, but it may be assumed that they differ only in minor details. The principal dimensions of this par-

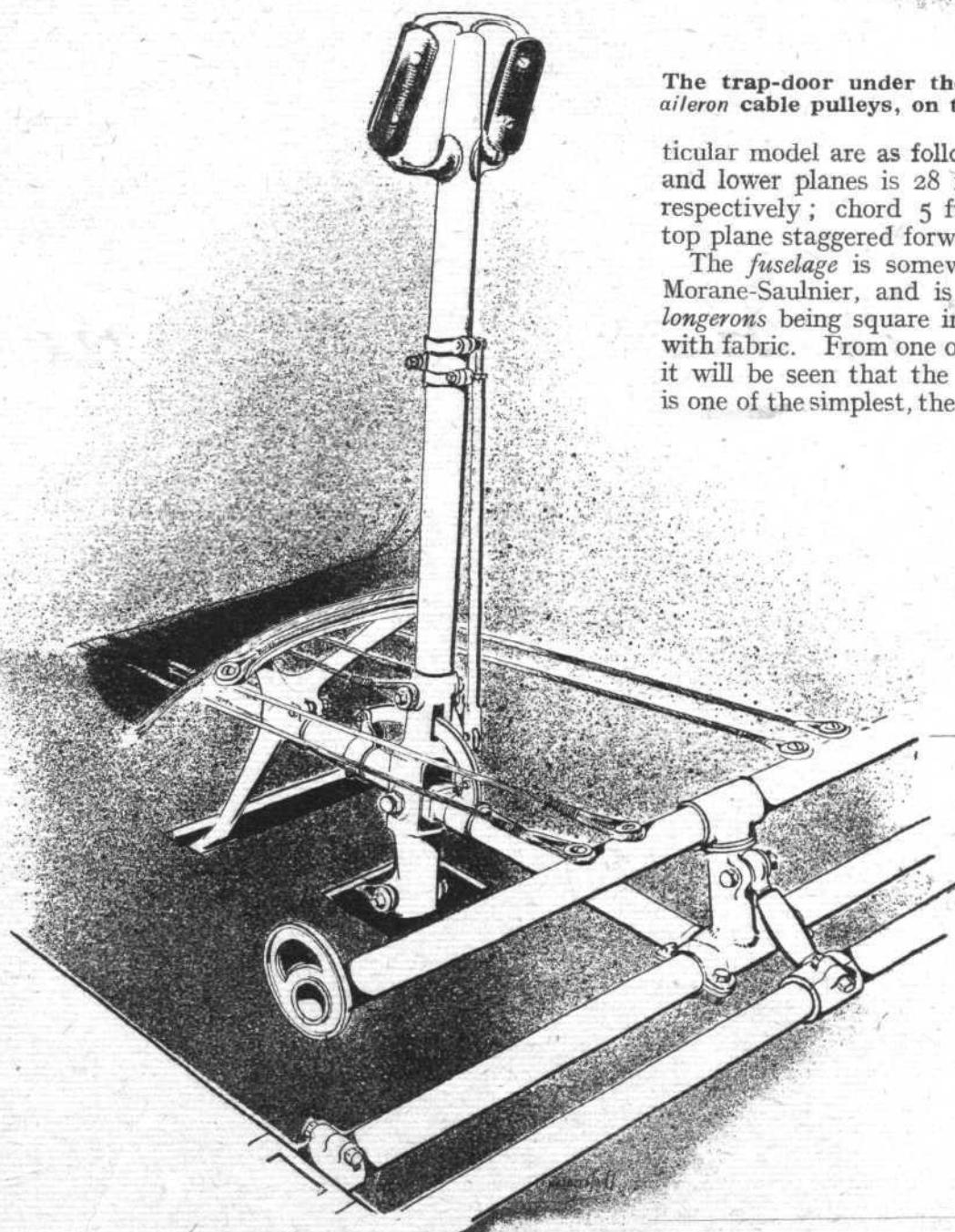


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The trap-door under the wing, giving access to the aileron cable pulleys, on the 1916 Halberstadt biplane.

ticular model are as follows:—The span of the upper and lower planes is 28 ft. 6½ ins. and 25 ft. 9 ins. respectively; chord 5 ft. 1½ ins.; gap 4 ft. 4 ins.; top plane staggered forward about 18 ins.

The fuselage is somewhat similar to that of the Morane-Saulnier, and is of wood construction, the *longerons* being square in section, hollow and bound with fabric. From one of the accompanying sketches it will be seen that the construction of the fuselage is one of the simplest, the struts being kept in position by blocks of wood tacked to the *longerons* each side of the strut, and by ply angle-pieces tacked to the struts. The wiring plate—for the outside bracing—consists of a single sheet steel plate bent to a right angle and placed in position over the *longeron* and



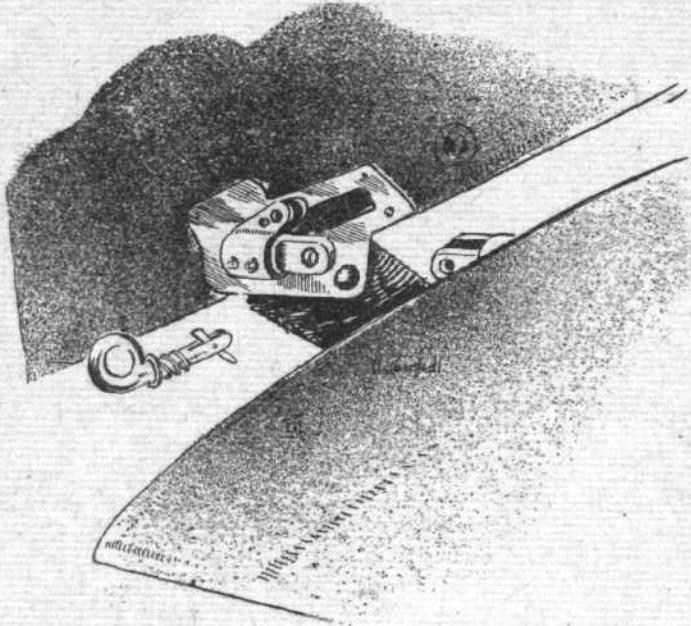
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The control of the 1916 Halberstadt biplane, showing the adjusting link, forward of the rudder bar, for varying the distance from the latter to the seat.

body and Oberursel motor—being, in fact, very similar to the Fokker biplane of that date. In 1916 the firm produced the improved type under review,

struts as shown. A bolt at each end of the plate passes through the strut, one of these bolts having an eye formed at its inner end to form the attachment

for the cross wire bracing. Aft of the cockpit the *fuselage* is covered with fabric except for the last bay, which has a three-ply covering. At this part the elevator and rudder control cables pass through long slots, reinforced with metal edgings, in the three-ply. This material is also used for covering the *fuselage* forward of the cockpit. The top of the latter is in

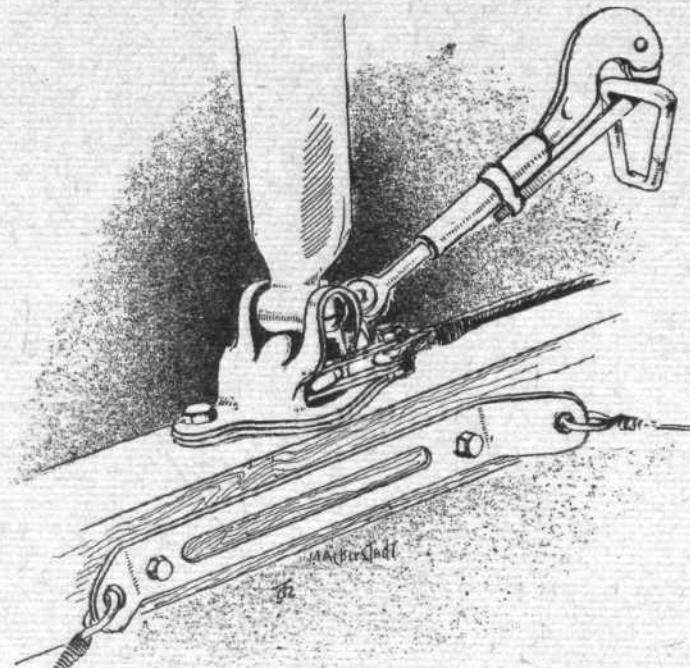


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Method of attaching the lower plane to the *fuselage* of the 1916 Halberstadt biplane. Note the spring locking device on the pin.

the form of a turtle deck, which tapers at the rear until flush with the *fuselage* at a point midway between the tail and the cockpit. This sloping portion of the turtle deck is built up of stringers over which fabric is stretched. In order to keep the fabric separated

a short distance from the sides of the *fuselage*—to avoid contact with nuts, wires, &c.—a beading is tacked along the outer corners of the *longerons*. The step in the side of the *fuselage* is fitted with a

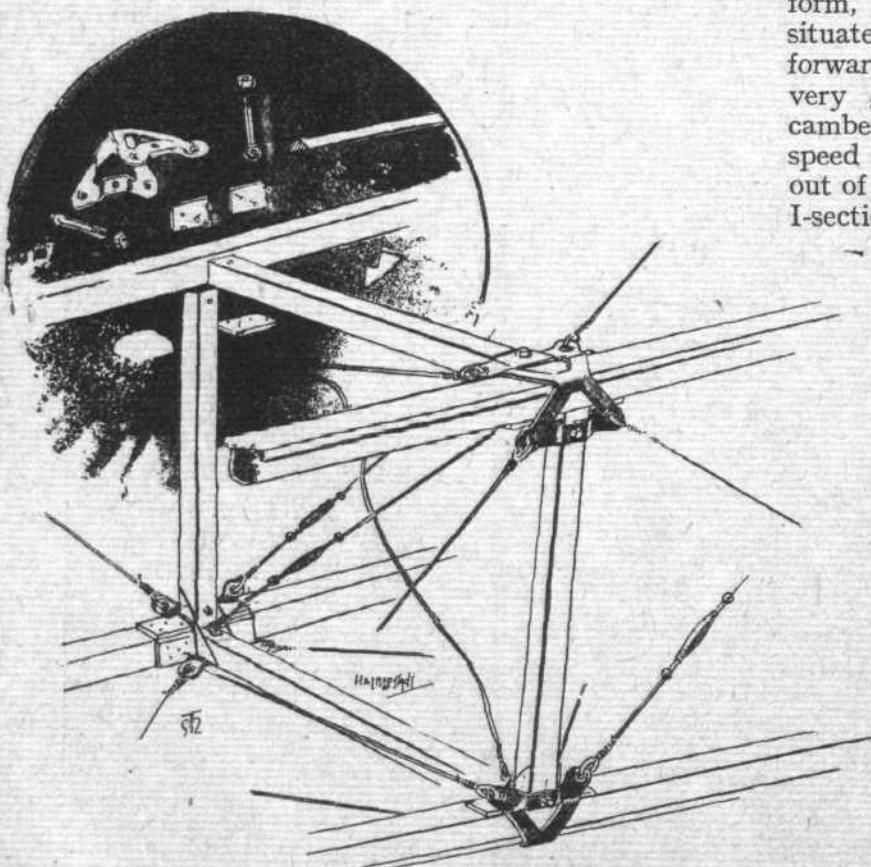


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The interplane strut fitting and quick release bracing cable attachment of the 1916 Halberstadt biplane.

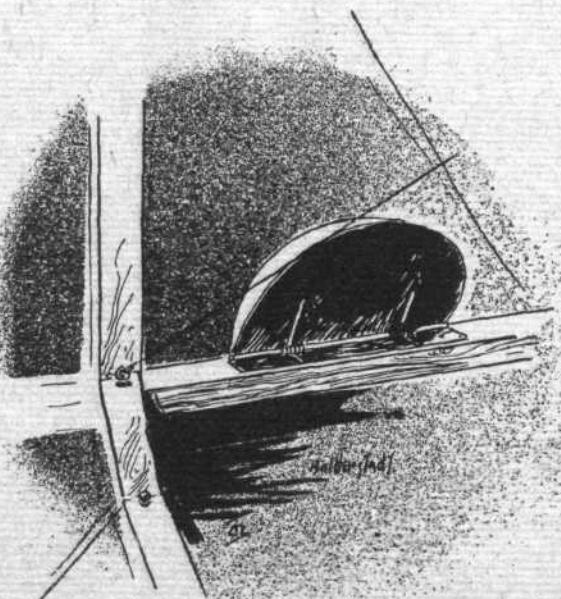
spring-closed aluminium trap door—as in some of our own machines—the action of which is clearly shown in one of the accompanying illustrations.

The main planes are almost rectangular in plan-form, being only slightly raked. The top plane is situated very close to the *fuselage*, and is staggered forward, so that the range of vision appears to be very good. As on most German machines, the camber is fairly pronounced, especially so for a speed machine. In construction they present little out of the ordinary, the spars being of the orthodox I-section with built-up ribs of webs and battens. There



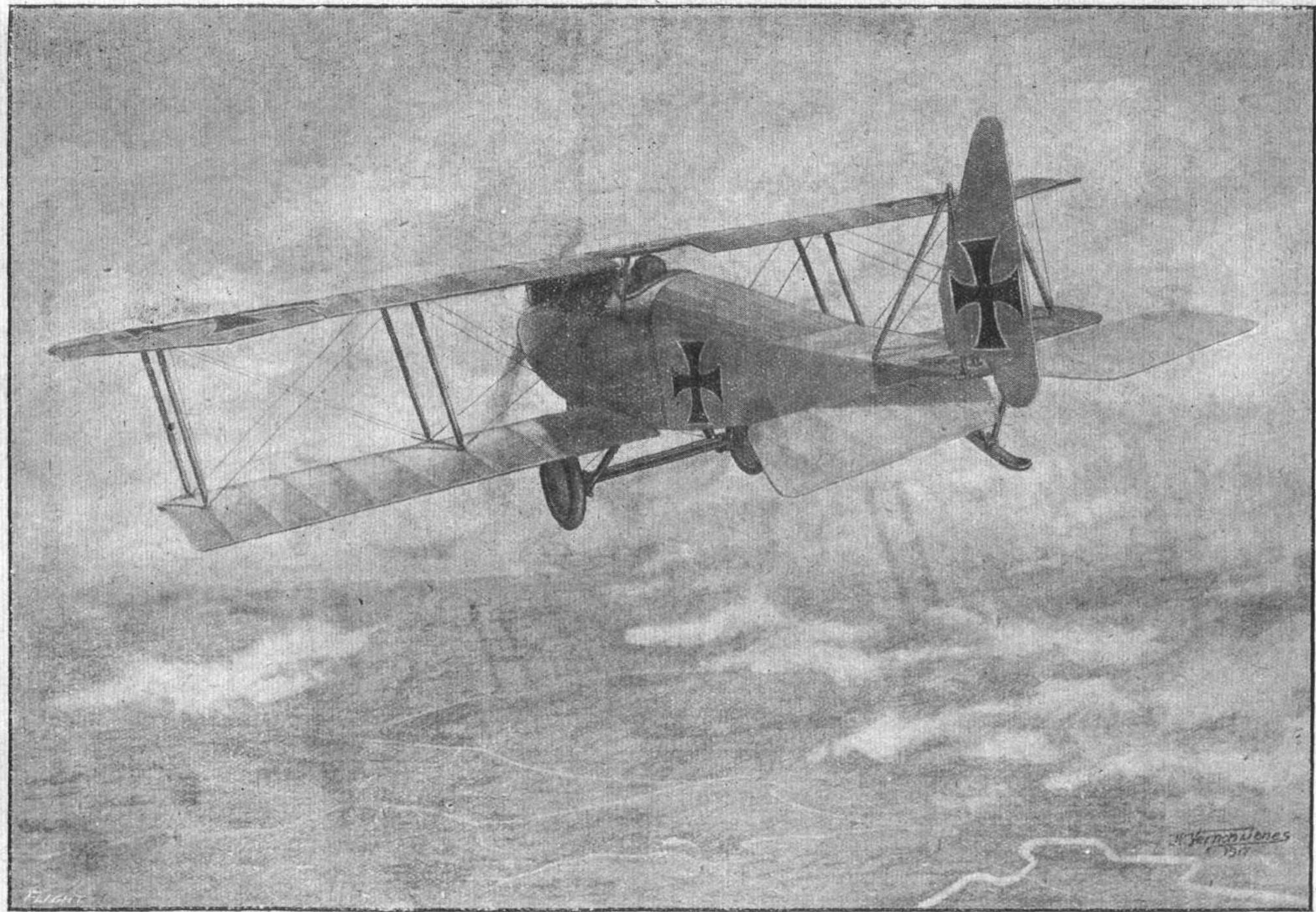
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Sketch showing the construction of the *fuselage* of the 1916 Halberstadt biplane.



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The foot-step trap-door on the *fuselage* of the 1916 Halberstadt biplane, seen from the inside.



THE 1916 HALBERSTADT FIGHTING BIPLANE.—Drawing of the machine in flight, seen from the rear.

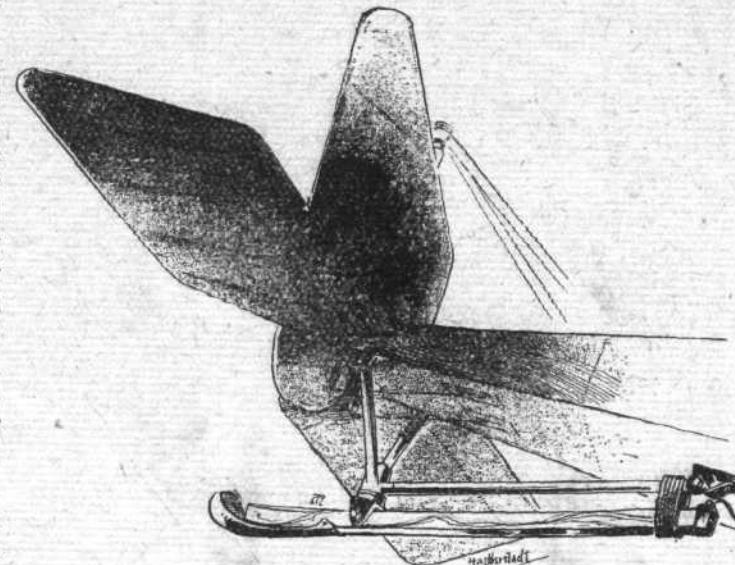
"Flight" Copyright

are two pairs of interplane struts, of streamline steel tube, on each side of the body. The attachment of these struts to the spars is effected by means of a metal fitting, secured to the spar by two bolts, on which is formed a fork receiving the end of the strut, a bolt passing through both. The struts can thus hinge sideways so that top and bottom planes can, when the bracing wires are slackened, lie one on top of the other for transporting. A smaller fork formed on the side of the fitting serves as an anchorage for the bracing cable, while the incidence bracing cable is attached to a metal clip which passes over a ring contained within the strut fitting. The internal bracing cables are fastened to a long, narrow, wiring plate bolted to the side of the spar. A wood or fibre packing piece is inserted between the spar and the strut fitting to give the latter the correct angle necessitated by the staggering of the planes. A quick-release device, similar to that employed on the L.V.G. machines, is provided for the bracing cables, enabling the latter to be withdrawn without upsetting the adjustment.

One of the accompanying sketches shows the method of attachment of the lower plane to the *fuselage*, and is, we think, self-explanatory. Suffice it to say that the lugs on the ends of the tubular cross members passing through the *fuselage*, in continuation of the wing spars, receive the forked ends of the latter, the locking being effected by means of the pin shown. A tongue formed on each of the aforesaid lugs serves as an anchorage for the lift wires.

The top planes are attached to a *cabane*, with which is incorporated a service petrol tank having the same

It will be seen that the tail surfaces follow Morane-Saulnier practice very closely, the elevators being exactly similar in plan-form. The rudder, however, is larger and of a peculiar pointed shape. They are constructed entirely of steel tubing, as shown in one

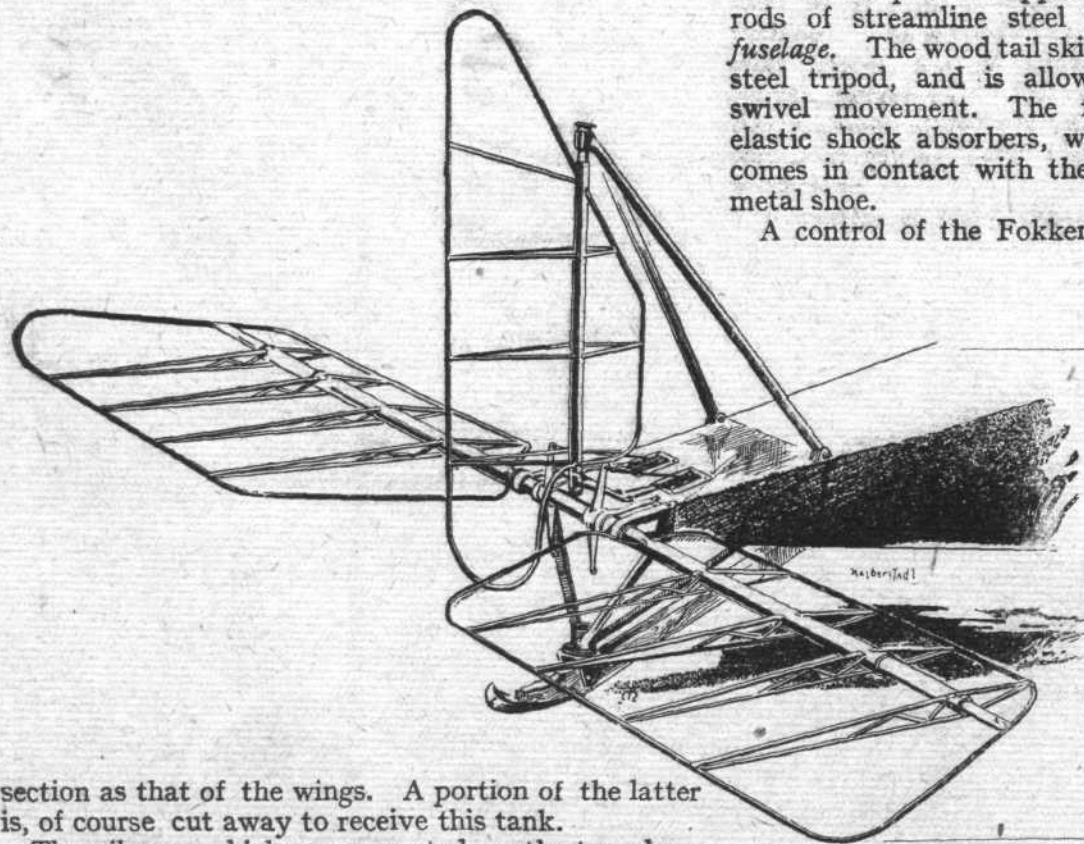


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The tail-skid of the 1916 Halberstadt biplane.

of our sketches. The ribs are built up of lengths of tubing, the ends of which are brazed to the tubular spar—or rudder post, as the case may be—and the tubular trailing and leading edges. Short tubular distance pieces are arranged zig-zag fashion between the upper and lower members of the elevator ribs. The rudder post is supported by two substantial tie-rods of streamline steel tubing, anchored to the *fuselage*. The wood tail skid is supported by a tubular steel tripod, and is allowed a certain amount of swivel movement. The forward end is held by elastic shock absorbers, whilst the rear end, which comes in contact with the ground, is fitted with a metal shoe.

A control of the Fokker type is fitted, consisting



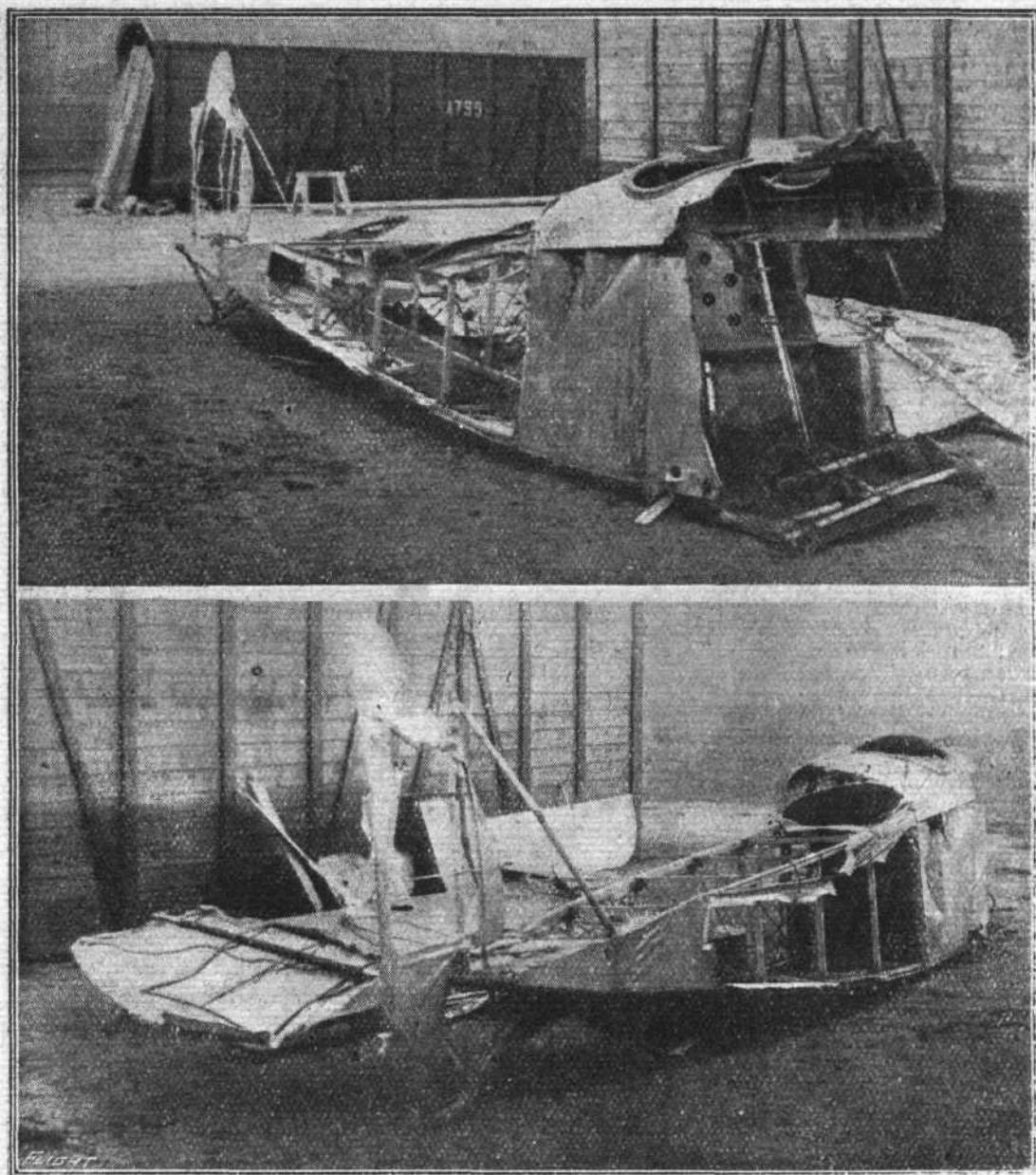
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Sketch showing metal construction of the elevators and rudder of the 1916 Halberstadt biplane.

section as that of the wings. A portion of the latter is, of course cut away to receive this tank.

The *ailerons*, which are mounted on the top plane only, are operated by a crank lever working in a slot formed in the wing, as in the Albatros machines. The pulleys carrying the *aileron* control cables are inside the wing, but an aluminium trap door allows for their inspection and adjustment. As is common practice with most German machines, the trailing edge of the *aileron* is given a slight up-turn.

of a vertical column with hand grip, mounted on rocking shaft lying fore and aft and supported between two tubular cross members. The vertical column pivoted so as to rock backwards and forwards (elevator control) over a quadrant, the purpose of the latter being, apparently, to lock the column in position in order that the pilot may have his hands free for firu



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Two views of a somewhat badly strafed Halberstadt biplane brought down "somewhere in France." The planes, struts, chassis, &c., form the heap in the background.

the gun. The control cables from the elevators are in duplicate, and one pair is attached to the column just above the rocking shaft, and the other below to an extension of the column passing through a hole in the floor of the fuselage. The *aileron* control cables are attached to a double X-shaped quadrant mounted on the rocking shaft, the lower arms passing through the floor of the fuselage and carrying the cables from the *aileron* crank levers; the top arms carrying the cables which are attached to the *ailers* near the trailing edge. A pivoted tubular rudder bar is mounted in the cross member carrying the front end of the rocking shaft. This bar is provided with end plates to prevent the pilot's feet from slipping off, whilst the distance from the seat to the rudder bar can be varied by means of the adjustable link, connecting the bar and the front-spar cross member, shown in our sketch.



#### New Head Quarters of the Aeronautical Society.

ONE result of the renewed activity of the Aeronautical Society of Great Britain has been the demand for better accommodation than the rooms in Adam Street, Adelphi, afforded. More suitable headquarters have been secured at 7, Albemarle Street, Piccadilly, W., and the transfer has now been effected. The telephone call is Gerrard 7373, and the telegraphic address "Didaskalos, London."

The chassis is of the orthodox V-type, each V consisting of two streamline steel struts welded to a short tubular skid, which serves as an anchorage for the rubber shock absorber. The rear strut is attached to the fuselage under the rear wing-spar attachment, a lug being formed on this fitting for the purpose.

A pair of 28-in. wire wheels (disc) are mounted on a tubular steel axle,  $1\frac{1}{8}$  in. diameter. The V's of the chassis are connected by two cross members, consisting of streamline steel tubes attached to the lower ends of each strut.

As regards the engines fitted to the 1916 Halberstads, these are, we understand, either 120 h.p. Argus (Benz type) or the new Mercedes-V. Unfortunately, we have not at present particulars as to the method of mounting the engine, &c., but hope to furnish details later.



#### Air Raid on Bruges.

ACCORDING to reports received by the *Nieuwe Rotterdamsche Courant* from Oostburg, between 10 and 11 p.m. on March 27th an air squadron dropped bombs on or near Bruges. The squadron was heavily fired at. A message received from Amsterdam on March 26th stated that a German munition store at Jabeke, near Bruges, had been blown up, probably by a bomb dropped from an aeroplane.

# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

**The Committee, 1917.**

The Duke of Atholl, M.V.O., D.S.O. (*Chairman*).  
 Col. Sir Capel Holden, K.C.B., F.R.S. (*Vice-Chairman*).  
 Lieut.-Col. W. D. Beatty, R.E.  
 Brig.-Gen. W. S. Brancker, R.F.A.  
 G. B. Cockburn.  
 Flight-Commander John D. Dunville, R.N.  
 Wing-Commander Spenser D. A. Grey, R.N., D.S.O.  
 Wing-Commander A. M. Longmore, R.N.  
 Lieut.-Col. F. Lindsay Lloyd.  
 Col. E. M. Maitland (Wing-Captain R.N.A.S.).  
 Squadron-Commander F. K. McClean, R.N.  
 Major J. T. C. Moore-Brabazon, R.F.C.  
 Lord Northcliffe.  
 Wing-Commander Alec Ogilvie, R.N.  
 Commodore Godfrey M. Paine, R.N., C.B., M.V.O.  
 Commander C. R. Samson, R.N., D.S.O.  
 A. Mortimer Singer.  
 T. O. M. Sopwith.

**Flying Services Fund.**

Boxes for collecting subscriptions for the Flying Services Fund are now available, and anyone wishing to have a box can obtain the same on application to the Secretary.

**New Club House.**

Members are reminded that bedrooms and meals are available in the New Club House. The price of the House Luncheon and Dinner is 2s. 6d. and 3s. 6d. respectively.

**THE FLYING SERVICES FUND**  
administered by

**THE ROYAL AERO CLUB.**

The Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W.

**Subscriptions.**

Total subscriptions received to March 27th, 1917 11,221 £ 6

B. STEVENSON, Assistant Secretary.  
3, Clifford Street, New Bond Street, W.

## ANSWERS TO CORRESPONDENTS.

[As a number of letters reach us signed with initials only, some of which do not give a complete address, we would point out that such communications cannot be dealt with in our columns. Full name and address, which will not be published, must always be given.—ED.]

**C. J. B. (Margate).**

The main difference between the two machines you refer to is that the latter has only one pair of struts on each side, and the top plane is of considerably greater span than the bottom wing. The former has two pairs of struts a side and upper and lower planes are of equal span. The other details you require must not be published during the war. From the somewhat vague description you give, we should think the machine must have been an R.E. 8.

**C. L. W. (Ashford).**

(1) Several seaplanes have been built in which the undercarriage was designed to allow of alighting on either land or water. One of the conditions of a competition held in Germany before the war, was that the competing machines had to start from land, alight on the sea, re-start from the sea, and alight on land. As a result of this competition, several undercarriages providing a combination of floats and wheels were produced with varying success. One of the most successful of Allied seaplanes so equipped is, perhaps, the Caudron seaplane, in which the wheels are mounted in a slot in the floats, to which they are rigidly attached. The floats themselves are, however, sprung by rubber shock absorbers. (2) By "stalling" an aeroplane is meant pulling its nose up to such an extent that it loses flying speed and begins to drop. Some machines will recover from stalling by dropping until the tail rises, and a glide is commenced, while others will drop sideways, the side-slip gradually turning into a nose dive, from which the machine is recovered by using the elevators. (3) "Aircraft of To-day" is illustrated by sketches and photographs. (4) No. (5) The speed of these machines is about 120 m.p.h.

**W. G. (S.W.1).**

When a round or square body moves through the air at a high velocity, there is formed at the back of the body a region of turbulent air, which considerably increases the resistance to forward motion. By streamlining the body, the magnitude of this region is reduced, with a consequent reduc-

tion in head resistance. In the case of an ideal or perfect stream-line form there would be no eddying motion or dead "water" region behind the body.

**A. A. S. (Stanmore).**

Full particulars of the Weiss monoplane, with scale drawings and detail sketches, were published in "FLIGHT" of June 17th, 1911. A copy can be obtained from our offices, the price being 1s. 6½d. post free.

**J. F. A. (Sutton).**

The principle of vane propulsion and lift suffers from the very serious drawback of a complicated mechanism to ensure that the vanes always meet the air at the desired angle at any point of their path. Experiments have been carried out with models of this type, but when it comes to build full-size machines, numerous mechanical difficulties are encountered. At present, it is only possible to conclude that any advantages such a system might possess are more than counteracted by the inherent disadvantages. The reason why the steam-engine is not used on aeroplanes is that, up to the present, it has not been possible to produce one of the same weight as a petrol motor of the same power. In dealing with the steam-engine, it is, of course necessary to take into account not only the engine itself, but also the boiler.

**A. D. (Kingsland, N. 1).**

The article, entitled "A Popular Aeroplane Design," published in "FLIGHT" during January, February and March, 1916, should help you to a considerable extent in the difficulties you are experiencing.

**D. L. (Streatham).**

Steel spring shock absorbers have frequently been fitted on aeroplanes, but experience has shown that it is necessary to incorporate with the design some device for absorbing the rebound, which is greater in steel springs than in rubber. If your design combines lightness with small rebound effect, there should, we think, be a very good market for it.

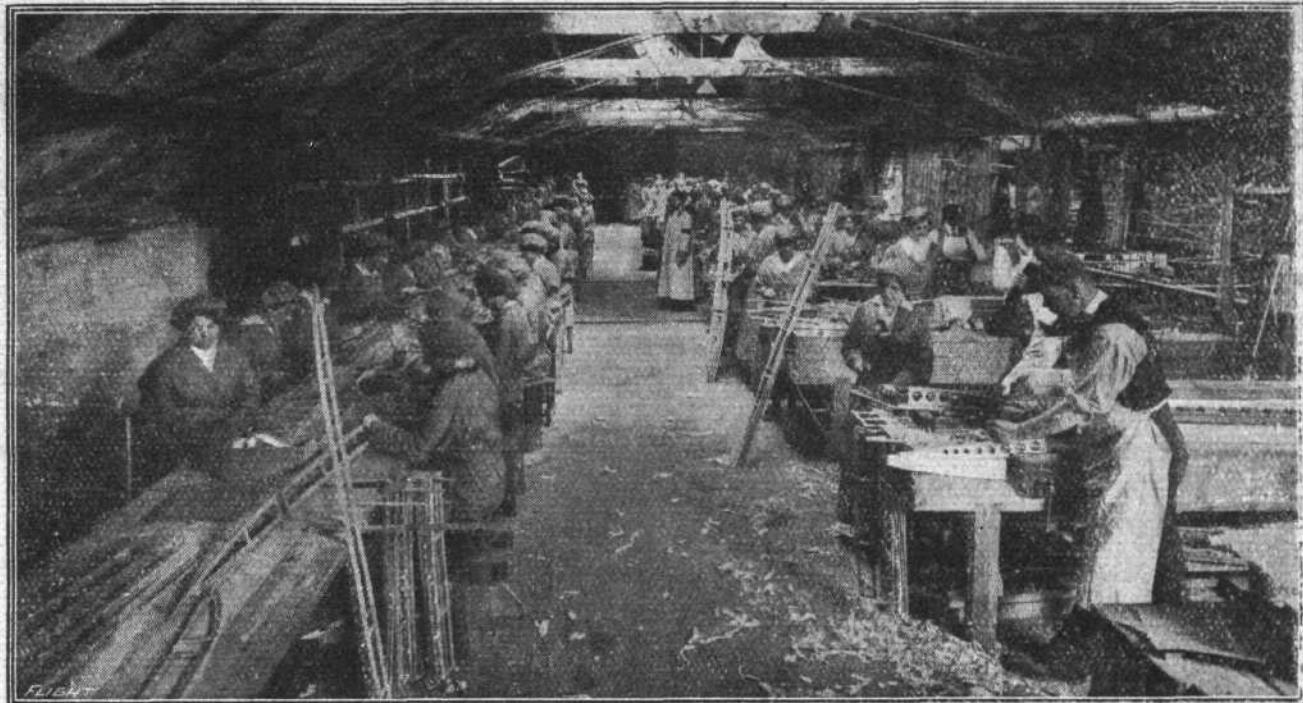
**Lieut. A. E. (R.F.C.).**

We have no information regarding the performance of the 300 h.p. Demont engine, and whether or not it was ever tested in actual flight. The address of the firm was, and probably still is, 31 bis, Avenue de la Defense, Puteaux, France.

## THE DILUTION OF LABOUR AND THE AEROPLANE INDUSTRY.

OPENING the exhibition of official photographs of women at work, and the samples of their handicraft, which was recently held under the auspices of the Ministry of Munitions at the Royal Colonial Institute, Mr. Kellaway, the Parliamentary Secretary to the Ministry, mentioned that a promi-

but female labour is now being utilised successfully in assembling the various main units of flying machines. The steady and increasing demand for aircraft calls for further utilisation of female labour, and the splendid results which have so far attended the efforts of the Ministry of Munitions as

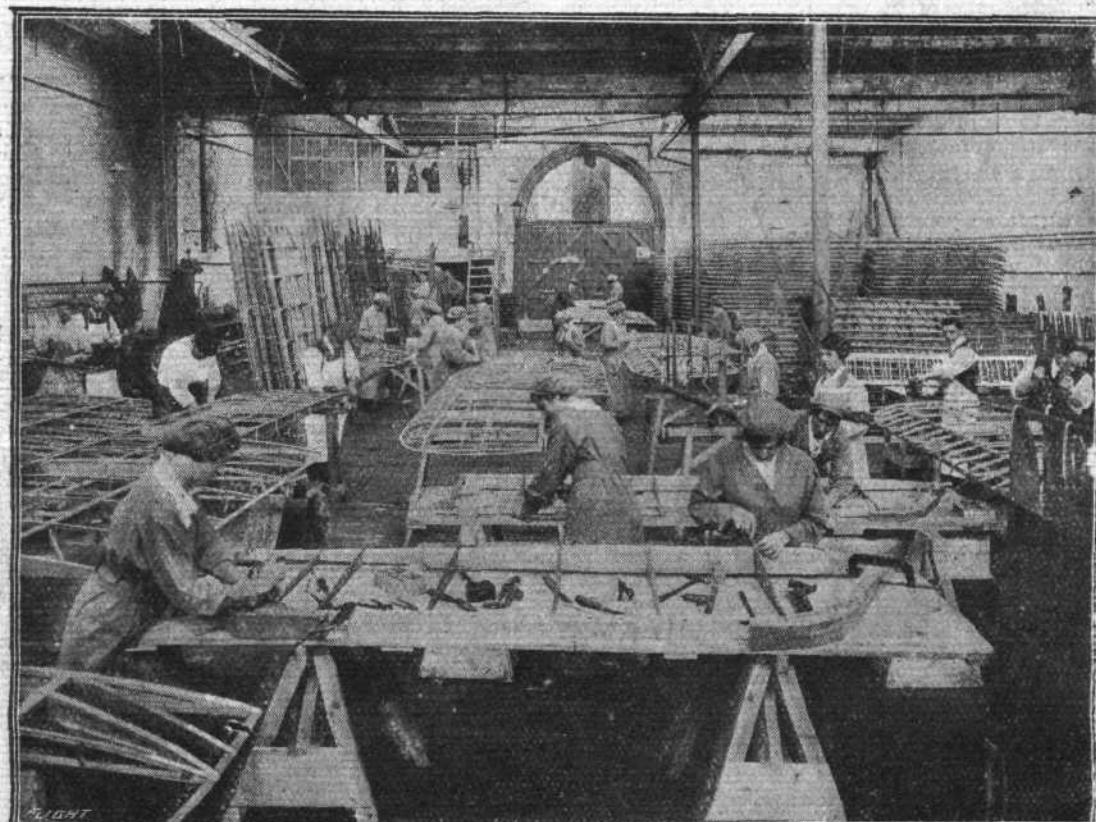


(Official copyright photograph. Published by special permission of the Ministry of Munitions.)

### THE DILUTION OF LABOUR.—General view of women working in rib-making shop.

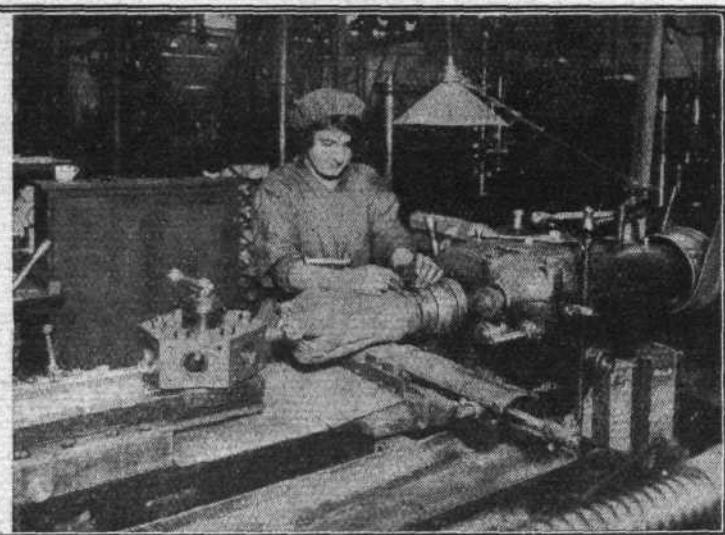
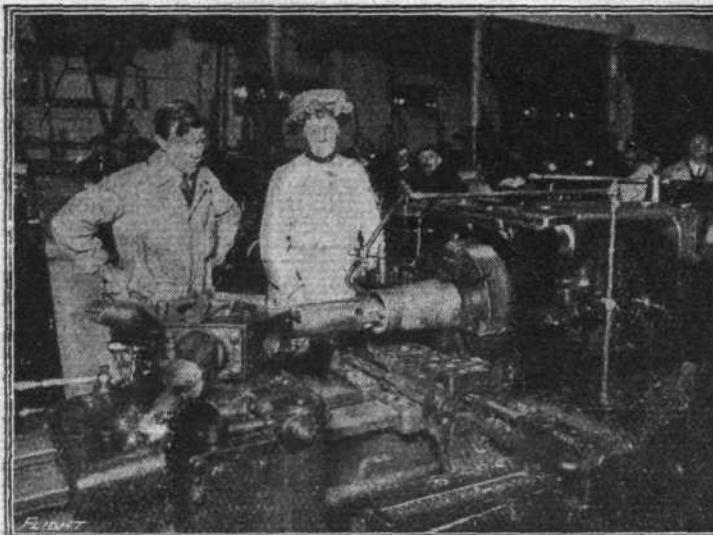
nent engineer had said that, given two more years of war, he would undertake to build a battleship from keel to aerial entirely by women labour. As regards aeroplanes, it was evident that that stage has almost been reached already, for not only were there samples on view of the way in which women are producing the many metal and wooden parts,

regards dilution lead to the hope of even greater success in the future. Certainly the exhibition showed that the work turned out by the women is up to the highest standard as regards accuracy and workmanship. From this point of view it is a pity that the exhibition could not either be held over an extended period, or, better still, have been sent round to the



The dilution of Labour.—Women assembling and screwing elevators and ailerons.

(Official copyright photograph. Published by special permission of the Ministry of Munitions.)



(Official Copyright Photographs. Published by special permission of the Ministry of Munitions.)

**THE DILUTION OF LABOUR.**—On the left, woman operating No. 9 Herbert combination lathe : finish boring and facing accurately to length cylinders for the Clerget rotary aero-engine. On the right, woman operating a centre lathe : cutting off to length and chamfering the end of cast-iron cylinder for aero-engine.

chief centres of industry. When dealing with the problem of the dilution of labour it is so much better when it is possible to give concrete examples of not only what can be done, but what has been accomplished. And the exhibition certainly showed that women workers can be entrusted with work which has not hitherto been thought possible. Thus in the section devoted to aero engines, there was seen a Clerget cylinder in various stages of manufacture, from the solid billet of steel to the finished cylinder, all the operations being carried out by women. The turning out of small details on automatic lathes is a sphere of activity in which female labour has proved eminently successful, but women are also capable of marking off, bending, riveting, welding, boring and drilling and other technical processes. Many of the examples of work of this description had been done by women who eighteen months ago knew nothing about engineering. Wood is not by any means an easy material to work, but here again women have proved their worth in a remarkable way, and, as our photographs show, extensive dilution of labour can be allowed

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in the carpenter's shop, where it has been considered that man was irreplaceable. Not only are women doing such work as the making of the parts of ribs, but they are now undertaking with complete success the assembling of the ribs, and also the building up of complete wing-flaps, tail planes, &c. One of the examples of assembling was a somewhat complicated tail-skid in which the whole of the work, wood, metal and assembling, was done by women.

It is gratifying to know that the efforts of the Ministry of Munitions to increase output by the dilution of labour has met with a sympathetic response from the men, who have done all in their power to make the women efficient producers, and in opening the exhibition Mr. Kellaway said no praise could be too high for the patriotism and enthusiasm with which the great body of trade unionists had enabled them to train the vast army of women workers—there being about 700,000 now employed. He also paid a tribute to the patriotism and good sense with which the great majority of the employers had assisted the efforts.

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R.F.C., was killed through his machine suddenly nose-diving and crashing to the ground.

#### A Fatal Accident in Australia.

MR. BASIL WASON, who will be remembered by many of our readers as having qualified for his pilot's certificate at Hendon in 1915, was killed in an accident on March 28th after a flight over Melbourne, in the course of which he looped the loop at a height of 2,000 ft. The aeroplane appeared to break and fell into the bay, where the pilot was found dead in the water beneath the wreckage of his machine. This is the first fatal flight accident in Australia.

#### Prince Friedrich Karl a British Prisoner.

SOME details of the capture of Prince Friedrich Karl have been given by M. André Tudesq, the special representative of *Le Journal* at the British Front. He states that the Prince had left for a reconnaissance over the British lines, and was overtaken by a British aviator who was returning from a night bombardment. A duel with machine-guns took place at the height of 2,000 metres (about 6,500 feet), the German's reservoir leaked, and the hostile machine dived slowly towards earth. Several soldiers were the only spectators of the descent, and saw a tall young man leaving the machine. Without taking the precaution to burn the aeroplane, he began running at full speed across the fields, attempting to escape. The British soldiers shouted "Stop!" but the Prince continued to run. Then an advanced-post sentinel in a crater fired two rifle shots, twice wounding the Prince, who fell hit in the heel and the chest, shouting, "I am Prince Friedrich Karl." Ambulance men carried him to a dressing station, and papers found left no doubt as to his identity. The Prince is now in hospital. The internal wound is serious, but does not seem likely to prove fatal.

#### Fatal Accidents.

A VERDICT of "Accidental Death" was returned at an inquest at Aldershot on March 28th on Lieut. J. Leask R.F.C., who was caught in a blizzard while flying in a single-seater aeroplane. Witnesses stated that the wind swung the machine completely round, but the pilot regained control. The machine was swung round a second time, turned two somersaults and nose-dived from a height of 500 ft. The pilot's neck was broken.

Whilst practising aerial fighting at Upavon, Lieut. A. P. Long, Middlesex Regt., attd. R.F.C., and 2nd Lieut. P. Sellers, Worc. Regt., attd. R.F.C., were killed. Lieut. Long was flying up and down about a mile from the aerodrome, and Lieut. Sellers was to mount above him and dive towards him as in an attack. In this operation one of the machines apparently struck the other machine on its tail. A verdict of "Accidental Death" was returned at the inquest on March 28th.

At a Leicestershire town on March 29th an inquest was held on 2nd Lieut. G. H. Boorne, 24, of the R.F.C., who died the previous day as the result of an accident whilst flying over the Midlands on March 8th, and a verdict of "Accidental Death" was returned. 2nd Lieut. Boorne was a native of Ottawa, Canada.

Lieut. E. Wallace, R.F.C., was killed while flying in Berks. on March 27th. The machine nose-dived and came with a terrible crash to the ground, falling from a considerable height. Lieut. Wallace was instantaneously killed, and at the inquest the following day a verdict of "Accidental Death" was returned.

An inquest was held at Hendon on March 28th on Mr. J. B. Fitzsimmons, who was killed on March 26th through one of the wings of his machine breaking when at a great height. A verdict of "Accidental Death" was returned,

While flying in Warwickshire on March 29th Lieut. Boone,

# AIRIGMS FROM THE FOUR WINDS

BRAINS in the Navy and Army have received another qualified lease of life under the Defence of the Realm Act. So long as national interests are fully safeguarded, inventors are, says Dr. Addison, to be allowed to do something with their inventions if they like. What a lucky dog the Inventor is, to be sure.

**FLIGHT-COMDR. LORD DOUNE**, son of the Earl of Moray, has received "honourable mention" in the competition for "Safety First" couplets which was arranged by the London General Omnibus Co. and its co-workers. The following is Lord Doune's version of a ruthless rhyme, *a la* chestnut:—

O! mummy, dear, what is that stuff that's so like strawberry jam  
It is, my dear, your careless pa, run over by a tram.

JUST like those careless trams. Presently the only "safety first" place will be in the air.

AFTER many moons the Deperdussin sensation has now been brought into the limelight of the French Courts. M. Armand Deperdussin entirely exonerates his wife, who is charged with him in a stupendous list of alleged irregularities, and has made a clean breast of his fall from the straight paths of commercial virtue, pleading as his excuse his complete obsession to the fascination of aviation, and more particularly the halo of heroism which it, at the time of his exploits as a pioneer of flying, brought with it. He lived, he said, in a mirage, and did not know what he was doing. He was the only guilty person. His wife, he asserted, was completely innocent, and if to pay for his faults he had to forfeit the remainder of his life he was ready to do so. His wife had been his first and greatest victim.

At this point M. Deperdussin, so the reporter alleges, "pancaked," as it were—otherwise, broke down.

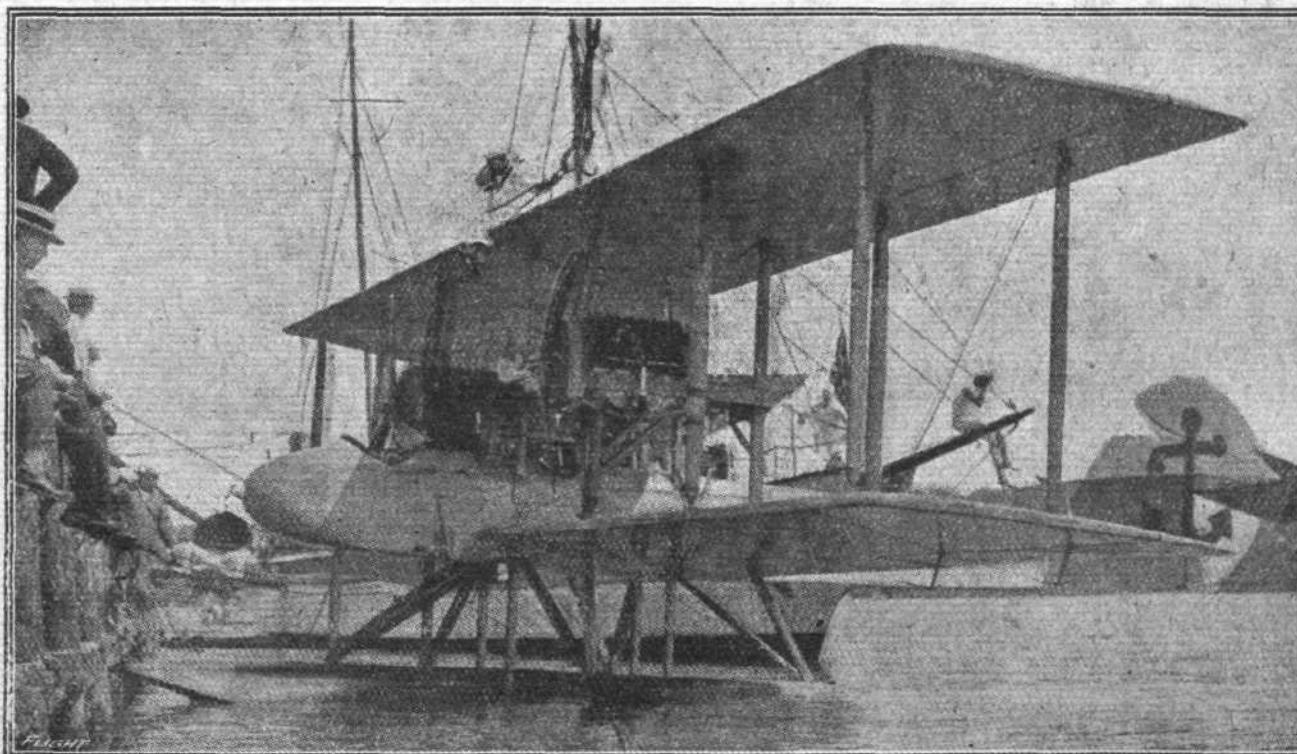
As there were round about 1,200 questions which the jury were called upon to answer in detail, we have resigned

ourselves to not giving the evidence of the trial verbatim and shall remain content to reproduce or otherwise the Court's summing up. One thing is certain, however erratic the methods, it is partly due to M. Deperdussin's schemes that the French have had in being such a fine aerodrome and works whereon and wherein to build Hun strafing machines, albeit of other designs than the original Deps.

SINCE the above paragraphs were in type the trial has been quickly finished, and in every way endorses the opinion expressed above with Madame D. set free and Monsieur penalised to the extent of five years imprisonment (the serving of the sentence to be suspended), there is little to quarrel with at this long interval after the "crimes." In many ways France, notwithstanding M. Dep's shortcomings, owes to him, as we suggest, a debt of gratitude.

THERE are many touches of pathos in the highly interesting articles of Mr. J. P. Whitaker, a young Yorkshireman, who, after two and a half years' detention with the Germans in Roubaix, France, has just managed to make his escape, which have been appearing in *The Times*. A personal note is sounded in last Friday's instalment, where Mr. Whitaker's refers to an incident associated with a couple of our lost flying officers. "Last year," the narrator writes, "a British aeroplane was brought down by the famous Capt. Boelcke at Lannoy, just outside Roubaix, and the pilot and observer lost their lives. They were buried with military honours in Roubaix Cemetery, in the presence of many of the townspeople. I was unable to be there, but I have seen the little wooden cross which marks the grave of Lieut. Gray and Lieut. Wilkinson, and I have seen the flowers with which French and British men and women covered the grave on All Souls' Day."

THE message thus conveyed will carry a ray of light to those who so far may have fretted as to how their lost ones had finally found their rest.

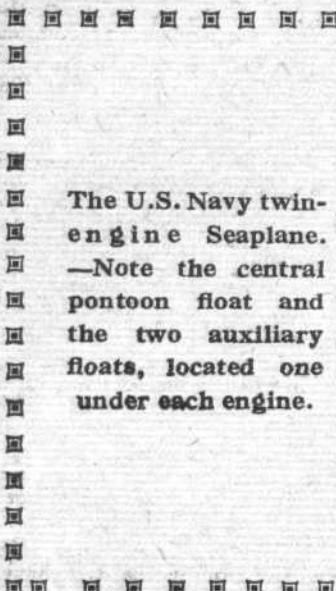


A large twin-engine seaplane, built for the U.S. Navy, at the U.S. Naval Yard, Washington, to the designs of Constructor Holden C. Richardson. It has a span of 57 ft., a chord and gap of 9 ft. 6 ins. and 10 ft. respectively, and a total supporting surface of 1,000 sq. ft. The engines are Curtiss VX type, 160 h.p., and the speed range is 45-80 m.p.h., the full flying load being 6,000 lbs.

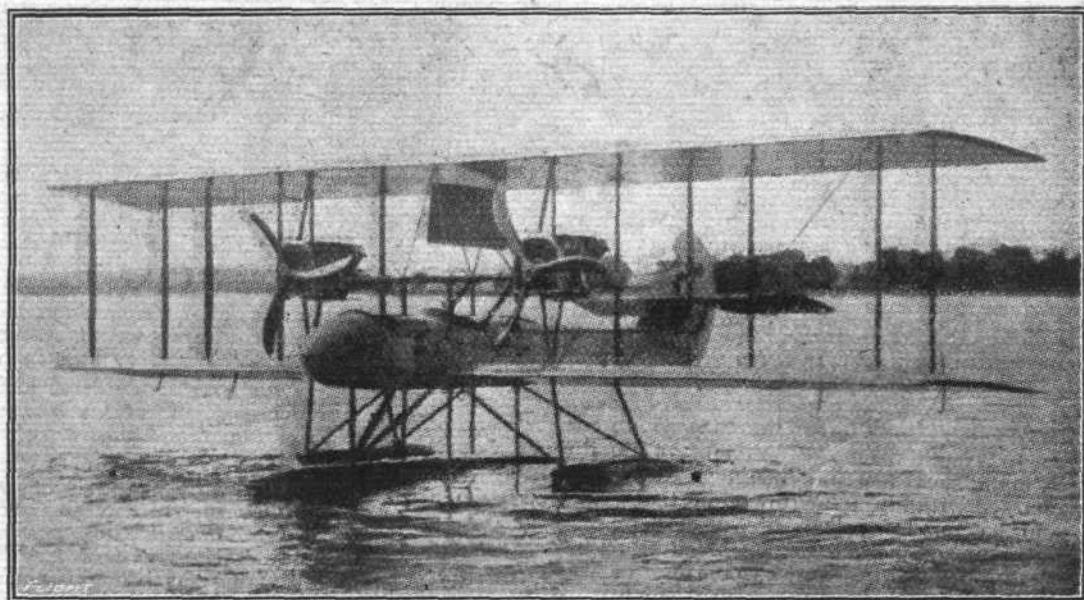
At long last the Home Secretary has cancelled the irritating orders for railway carriage blinds to be pulled down after dark, which hitherto has prevailed throughout the country. We have not in the past made a definite protest against the regulations, as it was difficult to criticise without a full knowledge of the defence organisation against air raids, or the methods of minimising risks therefrom. But it must always have been a fairly obvious solution to the question that upon certain notification all lights in trains, whether

devoted to his work, and he was one of the earliest investigators of the rigid system. His efforts, however, never received the official encouragement necessary to create the success which M. Spiess claimed for his designs.

THE cover of the R.F.C. uniform has not protected Miss Marjorie Joan Walker from conviction for driving a motor car at an excessive speed in King's Road, Fulham, the West London stipendiary noting his disapproval by a 10s. fine.



The U.S. Navy twin-engine Seaplane.  
—Note the central pontoon float and the two auxiliary floats, located one under each engine.



brought to a standstill or kept running, might be immediately extinguished, and thereby most effectually do away with any guidance to overhead pirates, except such illumination as might emanate from the engines. This is the scheme which for the future will prevail.

THE question of blinds down in houses is a very different proposition, and that, as it should, still remains in force, 8.30 being the hour for April to "douse the glim."

CANON HORSLEY, speaking at Southwark last week, said he thought that people read newspapers far too much. He

ANOTHER of the American aviators, J. MacConnell, in France, who—all honour to them—have taken on fighting a year or so ahead of the U.S. President, has forfeited his life, whilst attacking a Hun machine which sought to revisit the ground so long occupied by the Kaiser's armies.

A WELCOME order which has just been approved by the King is the wearing of a miniature replica of the Victoria Cross on the riband in undress and service dress uniform by all recipients of this decoration. The award of a bar to the original decoration will be marked by the addition of a



Aviatic Hotel,  
Toussus - le - Noble  
(S. et O.). A French  
aviation "centre of  
gravity."

wished newspapers had been abolished and they had kept the contents bills.

A natural *tu quoque* arises, but we refrain.

By the death of M. Spiess in Paris, another rigid airship designer—who helped to forward the navigation of the air in this direction—is lost to science. His life was largely

second miniature cross on the riband, an additional cross being added for each bar awarded.

ON Friday last week an extremely interesting transfer of ownership of a valuable historical collection of aeronautical prints took place under the "hammer" wielded by Messrs. Hodgson. The catalogue of 187 lots was a thing of beauty

in itself, and it is a source of gratification to students of aeronautics to know that the collection has not been broken up, the purchaser of the whole "sale" for £540 being Mr. Tregaskis. Many of the rare prints included in this sale were lent by Messrs. Hodgson to Lady Drogueda's exhibition at the Grosvenor Galleries, whilst the majority of the lots were evidently gotten together in the past by John Cuthbert and J. Fillingham. Both were in some way associated with Robert Cocking, who was killed in a parachute descent. Fillingham was a collector of ballooning autographs; one, addressed to him, dropped from Gypson's balloon in 1841, is in the collection.

THE revolution in Russia should surely bring peace a little nearer, with a newly freed people fighting against the most ghastly despotism the world has ever known. May, therefore, the hundred Russian cadets who have just arrived in England for instruction in flying, speedily acquire high proficiency, so that they may materially help to guide the Higher Commands in their tactics against the world's common enemy. These embryo pilots should carry back with them pleasant recollections of their British military greeting, and spread the feeling of fellowship which has been born between the two peoples.

#### TEN YEARS AGO.

*Excerpts from the "Auto." ("FLIGHT'S" precursor and sister Journal) of April, 1907. "FLIGHT" was founded in 1908.*

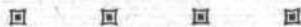
#### THE DELAGRANGE SUCCESS.

But if M. Santos Dumont was unlucky, the last day of the week saw the Delagrange aeroplane register a real triumph. It is true that the big aeroplane executed but a short free flight through the air. The spot at which it ultimately left the ground, and the spot at which it realighted, were only separated by a distance of 600 metres, so that the free flight was not a long one. The experiments with the machine were completed at Bagatelle at about 11 o'clock on the Saturday morning. On a slight decline the aeroplane was started against the wind, and after a short run rose to a distance of about 80 centimetres from the ground, and made a flight of some 20 metres. At 10 minutes to 12 a more pronounced success was obtained. The machine rose to 2 metres from the ground, and executed a flight of some 25 metres. It was found, however, that one of the wings tipped a little too much downwards, so M. Voisin stopped the experiments and redressed the balance by attaching to the lighter side a small

copper cylinder. At a quarter to one M. Voisin started again, the motor was running admirably, the big aeroplane rose calmly and equably to a height of 2 metres, and at from 2 to 4 metres carried out a flight of 60 metres in length before it again came to the ground. The time occupied was 6 seconds, giving a speed of 36 kiloms. per hour, or a little over 22 m.p.h. Above all, the aeroplane came to earth again without the slightest injury or even shock. It was a proud day, too, for M. Levavasseur, for the occasion provided another triumph for the Antoinette motor.

#### THE VUIA AEROPLANE.

On the same day that witnessed the first success of the Delagrange aeroplane, M. Vuia made several attempts at flight, also at Bagatelle, with his single aerocurve bird-like machine. He was not remarkably successful, only accomplishing a few jumps of 4 to 5 metres in length.



#### AN EARLY MORNING FLIGHT IN FRANCE.

##### YOUNG ENGLAND.

THE night has gone—I rise to greet the day,  
Brave glory on the threshold of the dawn,  
Silent—the song of leaves, and winds, and waves, and birds ;  
Below—what do they know of morn ?  
Borne upward, onward, o'er unknown seas,  
And plains, and dales, and hills—the multitude ;  
And torment of life's ways—where are they now ?  
I look to God, and hold His morn in gracious solitude.

Men hold my calling—"The living eyes of Britain."  
Long live my strength, that I may dare indeed  
For England's sake—all that I ever dreamed—  
All that a man might be—for her dear need.  
Exultant swiftly—high above—the glory that was France,  
Then turn about, and back again, where waves of silver foam  
Are dancing on a sunbeam dropped to earth.  
How heart may leap, how tired eyes turn, when one is nearing  
Home.

Then memory sits a laughing maid beside me  
Through Hampshire dells—on wings—ah ! keen and sweet,  
Light, sound and motion—responding to the charm,  
A poignant joy—a happiness complete.  
Yes, England calls—but not the homeward way.  
So turn again—where battles fought and won  
Are hourly history—on the scroll of fame.  
Yes, England calls—"Young England, carry on."

MABEL FREDERICKE.

## AVIATION IN

## PARLIAMENT.

#### R.F.C. Casualties.

MR. PEMBERTON BILLING in the House of Commons on March 28th asked the Under-Secretary of State for War whether the statistics as to the killed, wounded, and missing in the Royal Flying Corps recently given embraced the whole Flying Corps or only that part of it operative on the Western front; and, if so, can he now state our losses for the last six months of killed, wounded, and missing of the whole of the Royal Flying Corps both at home and abroad?

Mr. Macpherson : With regard to the first part of the question, the figures I gave related to the Western front. In reply to the second part, I am sorry that, in the public interest, these figures cannot be given.

Mr. Watt : Does the hon. gentleman still maintain that we can hold our own in aeroplanes on the Western front?

Mr. Macpherson : I cannot add anything to the exhaustive statement I made the other day.

Mr. Joynton-Hicks : When the late Lord Kitchener was Secretary of State for War did he not think it was not against the public interest to publish these details, and why does the present Secretary of State for War think it is inconsistent with the public interest?

Mr. Macpherson : I have not consulted my noble friend the Secretary of State, and I am not aware that my late noble friend made any such statement.

Mr. Billing : Why is it possible to publish the losses on the Western front and not the losses at home?

#### Defence from Aerial Attack.

MR. BILLING asked the Under-Secretary of State for War whether the scheme for the defence of this country from aerial attack initiated by his predecessor some 12 months ago is now complete?

Mr. Macpherson : It is not known to which particular scheme reference is made, but while it is undesirable to publish details, everything possible is being done, as events have shown, for the aerial defence of the country.

Mr. Billing : Is the hon. gentleman referring to the last raid?

Mr. Macpherson : No ; to many raids.

#### Co-operation of Services.

MR. BILLING asked the Under-Secretary of State for War whether there is complete co-operation between the Royal Naval Air Service and the Royal Flying Corps for the protection of our coasts and of this country from aerial invasion ; from whom do the respective Services receive orders to engage the enemy ; and at exactly what point do the Royal Naval Air Service hand over their quarry to the Royal Flying Corps, and *vice versa* ?

The Parliamentary Secretary to the Air Ministry (Major Baird) : I am sending the hon. member a copy of an answer which I gave on August 7th, 1916, to a question on this subject put by the hon. member for Bethnal Green. I regret that I have nothing to add to the information therein contained.

Mr. Billing : When orders are given in the event of a raid alarm are they given simultaneously to both Royal Naval Air Service and Royal Flying

Corps ? Is one officer responsible for the issuing of these orders, and are they issued to either corps without being issued to both ?

Major Baird : I must ask for notice.

#### Accidents during Training.

MR. BILLING asked the Under-Secretary of State for War what is the percentage of accidents, fatal and otherwise, that have occurred during the training of pilots for the Royal Flying Corps for the last six months of 1915 and 1916, respectively ?

Mr. Macpherson : 1·5 per cent. in 1915 and 1·53 per cent. in 1916.

Mr. Billing : What is the percentage based on ? Is it percentage on number ? Is it percentage per hundred ?

Mr. Outhwaite asked the Under-Secretary of State for War how many of the Royal Flying Corps have been accidentally killed in this country during the past three months ; in how many cases the accident was due to defect in the aeroplanes ; can he say in the latter cases what action has been taken to fix responsibility ; and with what result ?

Major Baird : The total number of casualties in the Royal Flying Corps in this country for the period December 1st to February 28th was 58. Of this number three were due to breakage of machines. Every accident is reviewed by a Court of Enquiry, and in any case where it appears advisable that some structural modification should be made in any particular type of machine, action is taken accordingly.

Mr. Outhwaite : If not due to structural defect, is it due to ineffective training of the pilots ?

Major Baird : I think it is impossible to say to what a flying accident is due. Flying is a very difficult thing to do, and is a new service. It is quite impossible to say on each occasion of an accident what it is due to.

Mr. Outhwaite : Is the hon. and gallant gentleman satisfied with the position as it is to-day ? Does he think there is no remedy for this large casualty list ?

Major Baird : No one can say he is satisfied with anything connected with aviation. It is in its infancy, and improvement is being made in every respect as regards training as experience suggests.

Mr. W. Thorne : Is the hon. and gallant gentleman satisfied that the best material is being used and the best workmanship, and the best possible engines are being put into the machines ?

Major Baird : I can safely say the system of inspection is as thorough as it can possibly be made. Like everything else connected with aviation, it is being perfected every day.

Mr. Billing : As I understand 30 per cent. of our total efficiency is being killed during training, will the hon. and gallant gentleman consider the advisability of altering the system of training, which is largely at fault for all these accidents ?

Major Baird : If I rightly understood the hon. member to say that 40 per cent. of our total efficiency is being lost in training, he is entirely in error. I have not the figures in my head, but I know they are nothing like that.

**Lord Cowdray and Parliament.**

MR. BILLING on March 29th asked the Prime Minister whether the Chairman of the Air Board has expressed his willingness to meet the members of this House for the purpose of debating the present position of our Air Services; whether these proceedings will be private, and whether the Chairman is prepared to receive written questions prior to such a meeting, that he may be enabled to answer them at the meeting; and also when is it proposed that this meeting should take place, and where it will be held?

The Parliamentary Secretary to the Air Board (Major Baird): The Prime Minister has asked me to answer this question. The President of the Air Board has been asked by the hon. member for Brentford to meet a body of members of both Houses, known as the Parliamentary Air Committee, who desire to lay their views before him. Lord Cowdray has consented to do so. The date of the meeting is not fixed, but it will take place in the House of Commons after the Easter Adjournment. The procedure will be quite informal.

Mr. Billing: Do we understand that that meeting is to be open to any member of this House?

Major Baird: It depends upon whether he is a member of the Air Committee, I imagine.

Mr. Pringle: Will the Chairman of the Air Board follow the example of the Food Controller, and invite members generally to come?

Major Baird: One reason why they have not all been invited is that he was not asked to do so; if he were asked to do it, I have no doubt my noble friend would find no difficulty whatever in meeting any member who may desire to meet him.

Mr. Lynch: As a member of the Air Committee of this House, may I protest against such a meeting being restricted to members of the Committee?

Mr. Speaker: The hon. member must ask a question, not make a statement.

Major Baird: My noble friend was asked by the Chairman of the Parliamentary Air Committee whether he would meet the members of the Committee, and he said "Yes," and it is difficult to see what reason there can be for objecting to that.

Mr. Billing: Will the hon. and gallant gentleman give an undertaking that every member of this House shall receive an invitation?

Mr. Faber: Is not Lord Cowdray a public official, and if he comes to the House of Commons as a public official can any meeting be restricted to the members of the Air Committee, or must it not of very necessity be extended to all members of the House?

Major Baird: I think other members can come if they want.

Mr. Faber: Will my hon. and gallant friend put it much more clearly than that? If no doubt other people can come, will he not say plainly that this meeting is open to all members of the House?

Major Baird: I thought I had said so. If they want to come they can come.

Mr. Joynson-Hicks: May I make a personal explanation? As Chairman of the Parliamentary Air Committee, with the sanction of the executive committee, I applied to Lord Cowdray to ask whether he would meet us to discuss certain points. I had no authority whatever to do so on behalf of the House generally, and it was purely a private meeting with a certain number of members who had banded themselves together. I should not have presumed to ask any Minister to meet the members of the House generally.

**The Training of Pilots.**

MR. BILLING asked whether the system of training pilots at present employed in the Royal Flying Corps is the same as that employed in January, 1916?

Mr. Macpherson: Yes, Sir, but as facilities have increased and greater demands have been made from France the standard has been raised.

**Orders for Obsolete Machines.**

MR. BILLING asked the Parliamentary Representative of the Air Board whether aeroplane builders who have received Government orders for the building of machines which are now considered obsolete or obsolescent for active service conditions have now had these orders cancelled; and, if not, why this has not been done?

Major Baird: I would refer the hon. member to the last part of the answer which I gave to him on the 7th instant.

**Responsibility for Building Policy.**

MR. BILLING asked the Under-Secretary of State for War whether the building policy of the Director-General of Military Aeronautics is being persisted in as to types and numbers; whether he is still responsible for deciding as to types and numbers; and, if not, for what reason has he been relieved of these duties?

Major Baird: The responsibility for the design and supply of aeroplanes for the use of the Royal Flying Corps (Military Wing) ceased to be vested in the Director-General of Military Aeronautics on the establishment of the present arrangements whereby a joint system of design and supply for both the naval and military branches of the Air Service has been established under the Air Board, of which Sir David Henderson is a member, and the Ministry of Munitions.

**Raids on Zeebrugge.**

MR. PEMBERTON BILLING, on March 30th, asked—(1) how many raids have been carried out at Zeebrugge in the past twelve months; (2) whether for the past twelve months we have had sufficient pilots, machines and high explosive bombs stationed at Dunkirk to initiate raids on the submarine bases at Zeebrugge every night; and, if so, why a continuous bombardment of this enemy submarine headquarters has not been permitted; and (3) on whose authority air raids at Zeebrugge and districts are initiated by the Royal Naval Air Service squadron situated in the Dunkirk district; and whether the local Wing Commanders have power to initiate raids from time to time on definite objectives, or whether for each raid it is necessary to obtain definite instructions from the Admiralty?

Dr. Macnamara: As regards these questions it is not considered desirable in the public interest to give the particulars asked for.

Mr. Billing: May I ask the right hon. gentleman whether the Germans are unaware of the raids that we have made upon them in the past twelve months, and, under these circumstances, is it not possible to give us in this House facts of which the Germans must be aware if they have been raided?

Dr. Macnamara: It is more than likely that they are aware, but as regards these three questions, it is not considered in the public interests to give the particulars asked for.

Mr. Billing: Is the right hon. gentleman aware that the whole submarine menace at the present time is due to the weakness of the Royal Naval Air Service in not bombing Zeebrugge from the first?

Mr. Speaker: That does not arise out of the question on the Paper.

**R.N.A.S. and Experimental Machines.**

MR. BILLING asked whether the officials of the Royal Naval Air Service are still ordering machines on their own responsibility without consultation with, or, alternatively, in opposition to, the views and wishes of the Air Board?

Dr. Macnamara: All orders for machines are placed by the Supply Department of the Air Board.

Mr. Billing: Is the right hon. gentleman aware that the Royal Naval Air Service are giving orders for experimental machines in Scotland and elsewhere without consultation with the Air Board, and is he aware that the Ministry of

Munitions have just issued an Order stating that no firm is to be permitted to do this work, and what is the position of a firm which refuses an Admiralty official?

Mr. Speaker: The hon. member must give notice of that question.

**Officers' Distinguishing Marks.**

MR. BILLING asked the First Lord of the Admiralty whether he is aware that distinguishing marks are worn on the uniforms of Squadron Commanders, Flight-Commanders and Flight-Lieutenants in the Royal Flying Corps for the purpose of differentiating between these three ranks; and whether he will consider the desirability of adopting a similar system of differentiation in the Royal Naval Air Service?

Dr. Macnamara: This matter is under consideration.

Mr. Billing: Will the right hon. gentleman consider the advisability of having some distinguishing mark between a Flight-Lieutenant, a Flight Commander and a Squadron Commander in the Royal Naval Air Service, as the present position is most difficult?

Dr. Macnamara: I said that the matter is under consideration.

Mr. Billing: Will the right hon. gentleman communicate to me the result?

Mr. Watt: Will the right hon. gentleman say how long it has been under consideration?

Dr. Macnamara: If the hon. member desires the information I will consult the Air Board.

**Alterations in French Designs.**

MR. BILLING asked the First Lord of the Admiralty whether he is aware that the wing fabric of a new aeroplane built in England to French design burst in the air recently; whether this accident was due to the French structural design having been altered by an official or officers of the Royal Naval Air Service; whether this accident indicates that such alteration would have been a source of danger to pilots on active service; and whether steps have been taken to prevent a repetition of such tampering by Admiralty officials with designs of approved excellence?

Dr. Macnamara: As regards the first part of the question, such an accident did occur. It was not due to faulty design. Neither is it true to say that it was due to alteration in design by an official or officers of the Royal Naval Air Service.

Mr. Billing: Is the right hon. gentleman not aware that the fabric which was put in place of three-ply wood caused this accident, and that it was done against the advice of the contractor, but the Admiralty insisted upon it?

Mr. Booth: Was it supplied by a German firm, and found to be faulty?

Dr. Macnamara: I cannot say that. The hon. member must give me notice of the question.

**Design of R.N.A.S. Machines.**

MR. BILLING asked whether any officer or official at present concerned with the construction or origination of aeroplanes or who has planned designs for the Royal Naval Air Service has ever produced a successful flying machine heavier than our type; whether any such machines have been used on active service; whether several officers who have produced successful designs before the war and joined the Royal Naval Air Service on or about the outbreak of the war have left the service and entered the employment of private firms; and whether the residue have been proved to possess sufficient ability to justify their being entrusted with the approval, alteration or condemnation of designs produced by private constructors of approved experience?

Dr. Macnamara: The answer to the first two parts of the question is in the affirmative. As regards the third part, officers have been allowed to resign their commissions in order to enter the employment of private firms where it has been clear that their experience and technical knowledge would be of advantage in the production of machines, and, therefore, in the public interest. As regards the last part of the question, the hon. gentleman is, of course, aware that the general question of the design of aircraft is now a matter which is dealt with by the Air Board. That being so, it does not appear to me that any useful purpose would be served by discussing by way of question and answer the abilities of the technical officers of the Royal Naval Air Department.

Mr. Billing: Can the right hon. gentleman give me the name of any type or the name of any given machine which these officers have designed which has been successful?

Dr. Macnamara: The hon. gentleman must put that question on the Paper.

**Orders for R.F.C. Aeroplane.**

MR. BILLING asked the Under-Secretary of State for War whether an aeroplane known as R.E. 7 is still employed for offensive work; when was the order first placed for this type; how many were ordered; how many have been delivered; and whether it is proposed to take delivery of the balance, or whether the orders have been cancelled and the contractors compensated, so that they may apply their labour to more productive work?

Major Baird: The answer to the first part of the question is in the negative; to the second, third and fourth parts that it is not in the interest of the country that details of this kind should be published; and to the last part of the question that deliveries of this machine ceased some time ago.

Mr. Billing asked what is the total number of aeroplanes which have been ordered by the Royal Flying Corps since the outbreak of war, and what is the total number of machines which have been used for active service training purposes, respectively?

Major Baird: It would not be in the interests of the country to give this information.

Mr. Billing asked when the Order for R.E. 8s was placed; what number was ordered; how many have been delivered; whether any serious accidents have happened to the pilots flying these machines; and, if so, to what reasons are these accidents attributed; whether it was intended to employ these machines upon active service against the enemy; and, if not, for what purpose were they ordered?

Major Baird: Contracts for the aeroplanes referred to have been placed at various dates, but it is not desirable to publish the numbers of machines ordered or delivered. Several fatal accidents have happened to pilots flying this machine, the majority of which have been attributed by the Courts of Enquiry to some error of judgment on the part of the pilot. The machine is not an easy one to fly, but its qualities render it of great value for service in the field, where it is now employed in considerable numbers. The possibility of structural alteration in the type is receiving the fullest consideration.

Mr. Billing asked the First Lord of the Admiralty what is the total number of aeroplanes which have been ordered by the Royal Naval Air Service since the outbreak of war, and what is the total number of machines which have been used for active service training purposes respectively?

Dr. Macnamara: I must decline to give the numbers asked for.

**Machines for Training Pilots.**

MR. BILLING asked the First Lord of the Admiralty what type of machine is employed for the training of pilots for land flying in the Royal Naval Air Service in the early stages?

Dr. Macnamara: The machines employed for the purpose are principally Avro and Maurice Farman type.

Mr. Billing asked what types of machines are now employed for the training of pilots in the Royal Flying Corps in the early stages?

Mr. Macpherson: Maurice Farman and Grahame-White aeroplanes are used for elementary training.

# PERSONALS

## Casualties.

Lieutenant FRED OSCAR BAXTER, M.C., Indian Army Reserve of Officers, attached R.F.C. (killed in action), had his commission in the I.A.R.O. in January, 1915. His award of the Military Cross was in the Birthday Honours List last summer, and he was gazetted flying officer, R.F.C., in the following October.

Captain GREVILLE OXLEY BRUNWIN-HALES Essex Regiment and R.F.C., killed while flying at the Front, aged 27, was the elder son of Canon and Mrs. Brunwin-Hales, of Colchester, and grandson of the late Rev. George Hales, of Norfolk and Yorkshire, and of the late John Oxley Parker, of Woodham, Mortimer Place, Essex. He was educated, like his father, at Winchester and Jesus College, Cambridge, and when war broke out was land agent to Mr. Christopher Turnor, of Stoke Rochford, Lincolnshire, and also to the Dowager Lady Carnarvon. He was gazetted Flight-Commander last December. His only brother, Second Lieutenant H. T. Brunwin-Hales, Lincoln Regiment, fell in the battle of Loos in October, 1915.

Second Lieutenant DAVID DENNYS FOWLER, R.F.C., elder son of the late Mr. and Mrs. James Fowler, of Wimbledon and Rottingdean, was born in South Australia, and was 19 when he was killed on March 17th. He was educated at Harrow, and after a short time at Trinity College, Cambridge, joined the Royal Flying Corps, and spent some months on service in the North of England. In September, 1915, he was ordered to Salonica, and in October was wounded in action and placed in hospital at Malta. In December he was invalided home, and on recovery was posted to an aerodrome at home. Both his brother officers and his men speak of him as a most fearless and competent airman. He was buried with military honours in Rottingdean Churchyard on March 20th.

Major MONTAGUE ELPHINSTONE, Army Service Corps, attached R.F.C. (died of wounds received in action on March 22nd), was 37 years of age, and the youngest son of Mr. Henry Walker Elphinstone. He reached the rank of major in the A.S.C. in June last year, and in the following December was gazetted flying officer in the R.F.C.

Flight Lieutenant (Sub-Lieutenant, R.N.) HENRY DAVENPORT GRAHAM, R.N. (killed), was the elder son of Harold J. Graham, C.E. (Cooper's Hill), late P.W.D., New South Wales, and Mrs. Graham, and grandson of the late Lieutenant Henry Davenport Graham, R.N. He was born in 1896 and entered Osborne in 1909. At the outbreak of war he was midshipman in the "Centurion," and in 1915 was selected for special service in airships. He was, in 1916, promoted sub-lieutenant. The same year he went abroad. He was promoted flight lieutenant in the New Year Honours List, and about the same time qualified for aeroplanes. It was while serving with the latter he met his death.

Major WILLIE GRATTAN-BELLEW, M.C., Connaught Rangers and R.F.C. (died on March 24th from injuries received while flying on active service), was second son of Sir Henry and Lady Sophie Grattan-Bellew. He was 23 years of age, and had his commission in the Connaught Rangers in March, 1916. His award of the Military Cross was gazetted last July "for conspicuous gallantry and skill on several occasions, notably the following: (1) With three other machines he attacked and drove off eight enemy machines, and forcing one to the ground. (2) He attacked four Fokkers, forcing one down to 2,500 ft. Another was seen to crash to the ground during the fight. (3) When on a bombing raid two of the machines got behind owing to clouds, and were attacked by Fokkers, Captain Grattan-Bellew returned and attacked three Fokkers, one of which his observer shot down and the others made off."

Second Lieutenant VALENTINE FRANCIS HERBERT HUGILL, 16th Royal Fusiliers, attached R.F.C., aged 22, reported missing October 16th, 1916, now reported killed in action, was the only son of Dr. G. F. Hugill, Elmfield, 197, Balham High Road, S.W.

Lieutenant W. J. LIDSEY, R.F.C., aged 21, whose death is reported, was the eldest son of Councillor William Lidsey, of Banbury. He was educated at Brackley School, and at the outbreak of war joined the Oxfordshire and Buckinghamshire Light Infantry. Lieutenant Lidsey was given his commission while serving in France. He afterwards transferred to the Flying Corps.

Second Lieutenant DUNCAN MATHESON MCLEAY, Argyll and Sutherland Highlanders and R.F.C., killed, was wounded at Festubert while serving in the ranks. He was 23 years of age, and received his commission last year in recognition of his soldierly qualities in the field. Second Lieutenant McLeay, who had been in the service of the North British Railway Company, was a son of Mr. and Mrs. McLeay, of Inverness, who lost another son at Loos.

Major LEONARD PARKER, Hussars and R.F.C. (now reported killed on January 7th, previously reported missing), was born in February, 1886, the fifth son of the Rev. the Hon. Algernon R. Parker and Mrs. Parker, of Maesfen, Malpas, Cheshire. Educated at Marlborough College and Christ Church, Oxford, he was captain of the Rugby Fifteen at Marlborough, and in the cricket eleven, and at Oxford he got his Rugby Blue in the 1905 team that just lost to Cambridge. Major Parker obtained his flying certificate before the war, and at its outbreak joined the R.F.C., subsequently becoming flight commander and captain, and later major and squadron commander. He went out to France early in 1915, and remained for a year at the Front, being slightly wounded in the summer of 1915. He returned to England in February, 1916, and went to France again in command of a squadron in the following November. On Sunday, January 7th, he went out over the German lines to take photographs, and never returned. Subsequently he was reported to have been attacked by two enemy aeroplanes, and his machine was seen to come down in German lines. Reports from Berlin state that he was shot in the air and picked up dead near Peronne on January 7th. This report has now been confirmed by a letter from his observer (now wounded) and a prisoner in Germany, and accepted as official by the War Office.

Second Lieutenant EDMUND DANIELL SPICER, R.F.C., previously reported missing, now stated to have been killed in action, was 18 years of age, and was the younger son of Mr. and Mrs. Newton Spicer. He took his pilot's certificate at Hendon in August, 1915, obtained his commission in the R.F.C. in April of the following year, and went on active service on July 4th.

Second Lieutenant LESLIE GOTTFRIED HARCOURT VERNON, M.C., Royal Welsh Fusiliers and R.F.C. (previously posted as missing, now reported killed), won the Military Cross last year "for conspicuous gallantry and skill. With Capt. Adams as pilot he attacked a flight of six enemy machines within their lines. They brought one down in flames, and, after being joined by a second British machine, drove off the remainder, one falling out of control. He has previously done fine work." Lieut. Vernon had his commission in the Royal Welsh Fusiliers in December, 1915, and was appointed an observer, R.F.C., in July, 1916.

Second Lieutenant GEORGE MACDONALD WATT, R.F.C. (killed), was the second son of Mr. George Watt, K.C., Sheriff of Inverness, Elgin and Nairn, and was 27 years of age. He was educated at Fettes College, and, after leaving, played Rugby football for Edinburgh Institution. Second Lieutenant Watt went to Burma in 1912, but returned to join the Army, subsequently getting his commission.

Lieutenant MELVILLE RICHARD HOWELL AGNEW ALLEN, R.F.C., who was accidentally killed while flying on March 21st, was the only son of Mr. and Mrs. Richard William Agnew Allen, of Woodlands, Clapham, near Bedford, and was 25 years of age. He was educated at Harrow and Trinity College, Cambridge, and after leaving the University he entered the works of Messrs. W. H. Allen, Son and Co., of Bedford, as a pupil, passing through all the departments. He joined the Royal Flying Corps in January, 1915, and went to the Front with his squadron early in September, 1915, returning home in December of the same year for special duty in the construction of aviation engines. For seven months he had the sole charge of testing engines. In this connection he successfully organised a factory on a bare piece of ground, where engines are now being turned out regularly each week. Eventually he returned to the Royal Flying Corps in September, 1916, and was appointed a flying officer to the Testing Squadron. He was an experienced pilot, and was much respected by his brother officers, non-commissioned officers and men. He was the cheeriest of companions, and his kindness and camaraderie endeared him to all who knew him, and he died as he wished to die—flying. He married in August, 1915, Dorothy Drina, elder daughter of Major and Mrs. Lightfoot, of Anchoret, Bedford.

Lieutenant LEASK, who was killed in an accident at Aldershot on March 27th, was the second son of Mr. and Mrs. Leask, of Sheriffbrae, Ferres. He was wounded early in the war in France when flying on observation duty. Afterwards he was engaged in England as an expert engineer on all types of aeroplanes, and was prepared to return to France as a first-class certificated pilot when he met his death.

Second Lieutenant EUSTACE BERTRAM LOW, R.F.C., who was accidentally killed on active service on March 24th, aged 18, was the third son of the Rev. A. E. and Mrs. Low, of St. John's Vicarage, Folkestone. He was educated at St. Christopher's, Eastbourne, and Haileybury. He received his commission and joined the R.F.C. from Haileybury in August, 1916, and went to the front last January.

Flight-Lieutenant PHILIP SELLERS, R.F.C., who has been killed while flying in England, was the third son of the late Mr. H. B. Sellers, formerly general manager of the Yorkshire Penny Bank. Educated at Sandhurst, Lieutenant Sellers was only gazetted Flight-Lieutenant a little over a fortnight ago. He was 18 years of age. His brother, Second Lieutenant Guy V. Sellers, has been in France with the Royal Field Artillery over two years.

#### Married and to be Married.

The marriage arranged between Lieutenant RICHARD CADMAN, R.F.C., youngest son of the late Mr. J. C. Cadman,

M.I.C.E., M.I.M.E., and Mrs. Cadman, of Newcastle, Staffordshire, and EILEEN MARY, eldest daughter of Mr. and Mrs. E. W. JOHNSON, of Llandudno, will take place quietly at Llandudno on April 25th.

The marriage arranged between Captain J. W. DARWIN, Coldstream Guards and R.F.C., and Miss SIBYLE ROSE, will take place on April 18th at Holy Trinity, Brompton, at 2.30.

The marriage arranged between Captain C. F. M. PICKTHORN, R.F.C., second son of the late Charles Wright Pickthorn and Mrs. Pickthorn, and BETTY DOROTHY, elder daughter of the late WILLIAM BELL and Mrs. BATTEN-BELL, of 24, Alwyne Mansions, Wimbledon, will take place (leave permitting) at St. Mary's Church, Wimbledon, on April 28th, at 2.30 p.m.

#### Items.

Lieutenant LEONARD WARD PRICE, Life Guards, attached R.F.C., who is reported missing in France, is a younger brother of Mr. George Ward Price, the well-known special correspondent of the *Daily Mail*, who is now acting as war correspondent at Salonica for the London newspapers.

The will of Captain KEITH LUCAS, Sc.D., F.R.S., R.F.C., Fellow of Trinity College, Cambridge, of Fen Ditton, Cambridge, who died on October 5th from injuries received in a collision of aeroplanes, has been proved at £6,782.

## THE ROLL OF HONOUR.

#### REPORTED by the Admiralty:—

##### Died.

Flight-Lieut. (Sub-Lieut. R.N.) H. D. Graham, R.N.

##### Accidentally Killed.

Flight-Sub-Lieut. W. S. Oliver, R.N.

Flight-Sub-Lieut. F. C. Walker, R.N.

##### Died of Injuries.

Prob. Flight Sub-Lieut. A. F. Harvey, R.N.

##### Drowned.

F 8484 Leading Mech. E. A. A. Rawson, R.N.A.S.

##### Accidentally Injured.

Flight-Sub-Lieut. G. G. H. Smyth, R.N.

##### Seriously Injured.

Flight Sub-Lieut. K. P. Preston, R.N.

##### Missing, believed Drowned.

F 11693 2nd Grade Air Mech. R. E. Gorman, R.N.A.S.

##### Missing.

Lieut. D. B. Woolley, R.M., attd. R.F.C.

#### Previously reported Missing, now reported Prisoners of War.

Flight Sub-Lieut. G. L. Elliott, R.N.

Flight Sub-Lieut. L. E. Smith, R.N.

##### Believed a Prisoner of War.

Flight Sub-Lieut. S. G. Beare, R.N.

#### Reported by the War Office:—

##### Killed.

Lieut. F. O. Baxter, M.C., A. Res. of Off., attd. R.F.C.

Capt. G. O. Brunwin-Hales, Essex and R.F.C.

2nd Lieut. J. S. Cooper, R.F.C.

2nd Lieut. A. F. Gibson, Leinsters, attd. R.F.C.

2nd Lieut. G. T. Gray, R.E., attd. R.F.C.

2nd Lieut. E. J. Hare, R.F.C.

Lieut. A. R. Leggo, Can. Cav., attd. R.F.C.

2nd Lieut. E. B. Low, R.F.C.

2nd Lieut. D. M. McLeay, A. and S. Highldrs and R.F.C.

Lieut. H. Norton, R.F.C.

2nd Lieut. H. Tagent, Irish F., attd. R.F.C.

2nd Lieut. R. A. W. Tillett, Yeo. and R.F.C.

2nd Lieut. G. M. Watt, R.F.C.

626 Flight-Sergt. R. J. Moody, R.F.C.

18006 2nd Air Mech. Chambers, R.F.C.

3158 1st Air Mech. S. C. Lamplugh, R.F.C.

##### Died of Wounds.

Major M. Elphinstone, A.S.C., attd. R.F.C.

2nd Lieut. F. H. Gay, R.F.C.

2nd Lieut. W. J. Lidsey, Ox. and Bucks. L.I. and R.F.C.

#### Previously reported Missing, now reported Killed.

2nd Lieut. S. F. Cody, R.F.C.

2nd Lieut. W. M. V. Cotton, R.F.C.

2nd Lieut. J. T. Gibbon, R.F.C.

2nd Lieut. P. C. E. Johnson, R.F.C.

2nd Lieut. J. V. Lyle, R.F.C.

Lieut. E. B. Maule, High. L.I., attd. R.F.C.

2nd Lieut. E. D. Spicer, R.F.C.

649 Flight Sergt. E. Haxton, R.F.C.

3023 Corp. B. F. G. Jeffs, R.F.C.

#### Previously reported Missing, now reported by the German Government Killed or Died of Wounds.

25178 Sergt. R. S. Evans, R.F.C.

##### Wounded.

2nd Lieut. A. A. Baerlein, R.F.A., attd. R.F.C.

Lieut. E. L. Benbow, M.C., R.F.A., attd. R.F.C.

2nd Lieut. A. D. Collins, R.F.C.

Lieut. H. F. Duncan, High. L.I. and R.F.C.

2nd Lieut. E. D. G. Galley, A.S.C., attd. R.F.C.

2nd Lieut. G. H. Haydock, High. L.I., attd. R.F.C.

Capt. H. W. G. Jones, Welsh and R.F.C.

2nd Lieut. H. Kirby, Buffs (E. Kent), attd. R.F.C.

2nd Lieut. R. Littlejohn, R.F.C.

Capt. C. N. Lowe, R.F.C.

2nd Lieut. S. C. Peacock, London and R.F.C.

2nd Lieut. S. J. Stocks, S. Lancs., attd. R.F.C.

2nd Lieut. D. K. Sworder, R.F.C.

2nd Lieut. F. G. Taylor, R.F.C.

2nd Lieut. C. M. White, R.F.C.

Lieut. C. A. F. Whitley, M.C., R.F.C.

Lieut. N. W. Wickham, R.F.C.

2008 Sergt. J. E. Prance, R.F.C.

7653 1st Air Mech. W. H. Bond, R.F.C.

#### Wounded and Prisoner of War in German hands.

2nd Lieut. W. A. Reeves, R.F.C.

#### Previously reported Missing, now reported Wounded and Prisoner of War in German hands.

2nd Lieut. S. Alder, Sherwood For., attd. R.F.C.

##### Missing.

Lieut. W. Anderson, M.C., R.F.C.

2nd Lieut. F. Allinson, Queen's (R. W. Surrey), attd. R.F.C.

Lieut. R. P. Baker, Can. Inf., attd. R.F.C.

Capt. C. P. Bertie, R.F.A. and R.F.C.

Lieut. H. Butler, Yorks., attd. R.F.C.

Lieut. H. A. Chuter, R. Fus., attd. R.F.C.

Capt. W. H. Costello, R.G.A. and R.F.C.

2nd Lieut. E. Elgey, R.F.A. and R.F.C.

2nd Lieut. J. G. Fair, Yeomanry and R.F.C.

Lieut. C. G. Gilbert, R.F.C.

Capt. E. J. Henderson, R.F.C.

Capt. A. M. Lowery, R.F.C.

2nd Lieut. J. R. Middleton, R.F.C.

2nd Lieut. L. A. Norris, R.E., attd. R.F.C.

2nd Lieut. N. A. Phillips, R.F.C.

2nd Lieut. S. S. B. Purves, Yeomanry and R.F.C.

Lieut. G. W. Swann, A.S.C., attd. R.F.C.

Lieut. L. S. Ward-Price, Household Cav., attd. R.F.C.

Lieut. A. S. Whiteside, Can. Mach. Gun Co., attd. R.F.C.

Lieut. J. G. Will, R.F.C.

61603 2nd Air Mech. F. J. Ridgway, R.F.C.

#### Previously reported Missing, now reported Prisoners of War in German hands.

2nd Lieut. F. H. Bronskill, R.F.C.

Lieut. J. MacLennan, Cameronians, attd. R.F.C.

2nd Lieut. R. T. Whitney, R.F.C.

# THE SCREW PROPELLER IN AIR.

By M. A. S. RIACH.

(Continued from page 304.)

## SPECIAL CASES.

I now propose to give a solution for the total efficiency of an airscrew having a certain type of blade outline under the hypothesis of inflow, and also a formula for the brake horse-power necessary to sustain a given weight without axial advance through the air. This latter constitutes the problem of the helicopter.

For simplicity in the analysis in both the above cases, a form of blade outline analogous to that defined by Mr. A. R.

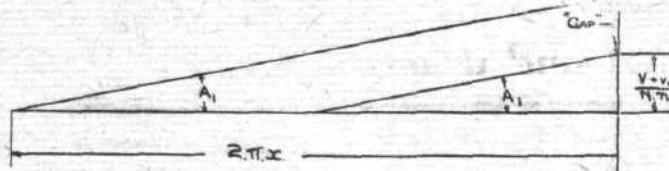


Fig. 5.

Low as the "Rational Form" will be employed. The difference between Mr. Low's blade function and the one here adopted lies in the modification introduced as the result of the conception of an inflowing velocity ahead of the screw disc altering the value of the "gap" or distance between consecutive blade paths. Fig. 5 explains this point.

The "gap" is seen to have a value of

$$\frac{2\pi x \sin A_1}{N}$$

where  $(N)$  denotes the number of blades of the airscrew.

Hence, making the blade function  $f(x)$  equal to the "gap," we have :—

$$f(x) = \frac{2\pi x \sin A_1}{N}$$

$$\text{and } b = c_1 f(x) = \frac{c_1 \cdot 2\pi x \sin A_1}{N}$$

Now substitute this value for the blade width  $(b)$  in the formula obtained from equating the thrusts, and we get :—

$$\tan A_1 = \frac{2\pi x \cdot c_1 \cdot cy_1 + f.P}{2\pi x \cdot (f + c_1 \cdot cy_1 \cdot \tan \gamma_1)}$$

where  $(P)$  denotes the effective pitch of the airscrew, i.e., the advance per revolution, and  $f = g \cdot (1 + V_2/V_1)$ . And the value of  $(b)$  in terms of  $(c_1)$  is obtained from the formula :—

$$b = \frac{c_1 \cdot 2\pi x}{2\pi x \cdot c_1 \cdot cy_1 + f.P}$$

$N = \sqrt{4\pi^2 x^2 \cdot [f + c_1 \cdot cy_1 \cdot \tan \gamma_1]^2 + [2\pi x \cdot c_1 \cdot cy_1 + f.P]^2}$

and  $(c_1)$  is the value in this case of

Blade width at radius  $(x)$

Gap at radius  $(x)$

Very roughly this formula for  $(b)$  boils down to :—

$$b = \frac{c_1 \cdot P}{N} \text{ and } c_1 = \frac{b \cdot N}{P}$$

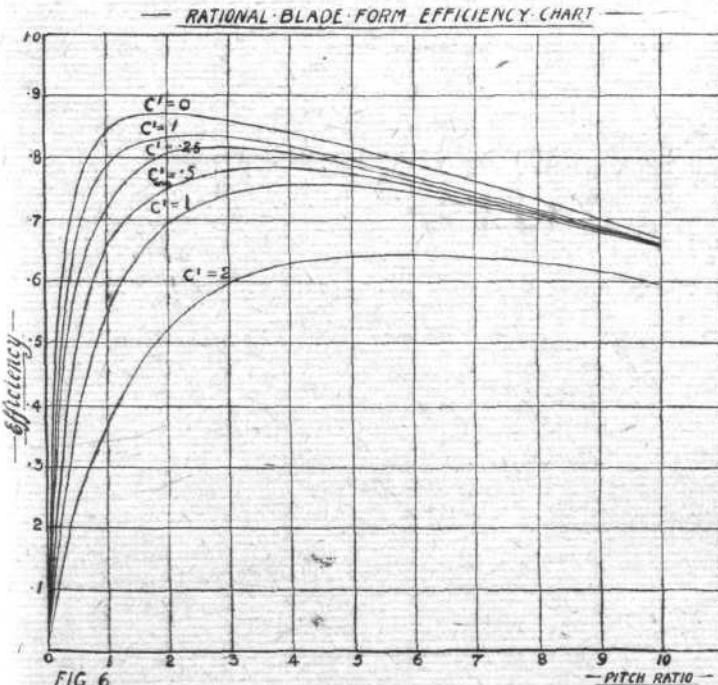


FIG. 6

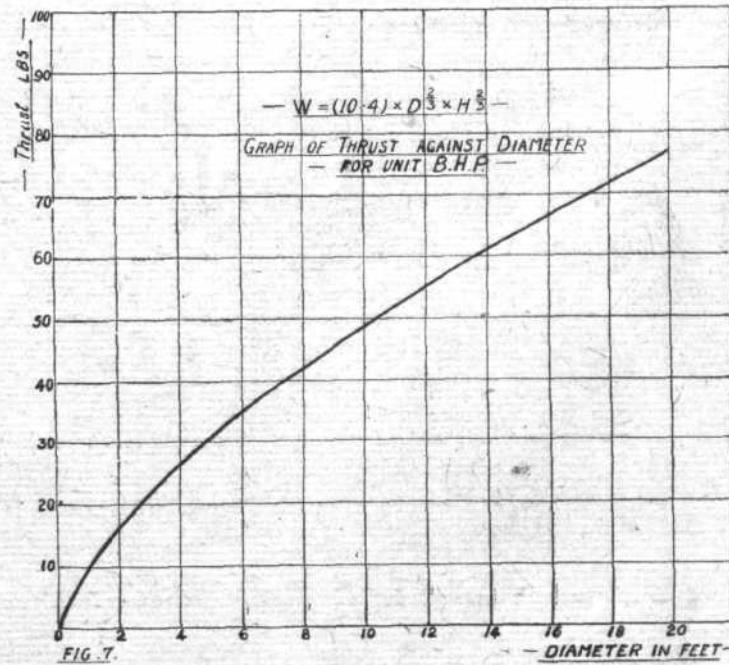


FIG. 7

Consider the general efficiency formula, viz.:

$$\eta_1 = \frac{P}{2\pi} \cdot \frac{\int_{r_0}^r cy_1 x^2 f(x) \sec A_1 (1 - \tan A_1 \tan \gamma_1) dx}{\int_{r_0}^r cy_1 x^3 f(x) \sec A_1 (\tan A_1 + \tan \gamma_1) dx}$$

in conjunction with that already established, viz.:

$$cy_1 = \frac{N.b. [1 - \tan A_1 \tan \gamma_1]}{q \cdot 2 \cdot \pi \cdot x \cdot \left( \frac{H}{V_1} \right)}$$

and therefore putting (b) =  $c_1 f(x)$ , we get

$$f(x) = \frac{q \cdot 2 \cdot \pi \cdot x \cdot \left( \frac{H}{V_1} \right) \sin A_1 [\tan A_1 - \tan A]}{cy_1 N.c_1 (1 - \tan A_1 \tan \gamma_1)}$$

whence, substituting for this function  $f(x)$  in the general efficiency formula, we get:

$$\eta_1 = \frac{P}{2\pi} \cdot \frac{\int_{r_0}^r x^3 \left( 1 + \frac{V_2}{V_1} \right) \tan A_1 (\tan A_1 - \tan A) dx}{\int_{r_0}^r x^4 \tan A_1 \left( 1 + \frac{V_2}{V_1} \right) (\tan A_1 - \tan A) (\tan A_1 + \tan \gamma_1) dx}$$

and now if we make  $(V_1)$  and  $(V_2/V_1)$  constant over the blade, which Mr. Lanchester defines as the condition for maximum efficiency, and  $(r_0)$  equals zero, we get:

$$\eta_1 = \frac{P}{2\pi} \cdot \frac{\int_{r_0}^r x dx}{\int_{r_0}^r x^2 (V + V_1 + 2\pi n x \tan \gamma_1) dx}$$

and if  $\tan \gamma_1 = 0$ , then  $\eta_1 = V/V + V_1$ , thus reducing to the ordinary R. E. Froude formula.

But in practice  $\tan \gamma_1$  is always greater than zero, and therefore, evaluating the above, we get:

$$\eta_1 = \frac{3 \cdot V \cdot \pi^2 \cdot n^2}{8} \cdot \frac{d^3 (1 - h^2)}{\tan \gamma_1 \cdot [\{\pi n d - \tan \gamma_1 (V + V_1)\}^3 - \{\pi n d h - \tan \gamma_1 (V + V_1)\}^3] + \frac{3 \cdot (V + V_1)}{8} \cdot [1 + 3 \cdot \tan^2 \gamma_1] \cdot [\{\pi n d - \tan \gamma_1 (V + V_1)\}^2 - \{\pi n d h - \tan \gamma_1 (V + V_1)\}^2] + \frac{3 \cdot \tan \gamma_1 \cdot (V + V_1)^2}{2} \cdot \left[ 1 + \frac{3 \cdot \tan^2 \gamma_1}{2} \right] \cdot \pi n d [1 - h] + \frac{3 \cdot \tan^2 \gamma_1 \cdot (V + V_1)^3}{4} \cdot \sec^2 \gamma_1 \log_e \left[ \frac{\pi n d - \tan \gamma_1 (V + V_1)}{\pi n d h - \tan \gamma_1 V + V_1} \right]}$$

Where  $h = r_0/r$ , a fraction which is greater than zero in this case of discontinuous blade outline.

Now consider the brake horse-power necessary to sustain a total weight of  $(W)$  lbs. in the air.

The brake horse-power required at an axial speed upwards of  $(V)$  feet per second is given by

$$H = \frac{W \cdot V}{550 \cdot \eta_1}$$

and therefore substituting for  $(\eta_1)$  the value given from Mr. Low's "Rational" blade form, we get, making  $(V)$  equal to zero,

$$H = \frac{550 \cdot 5 \cdot d \cdot c_1 \sqrt{\pi \rho f}}{8 \cdot \sqrt{2} \cdot W \cdot [f \cdot \tan \gamma_1 + c_1 \cdot c_1 \cdot \sec^2 \gamma_1] [f + c_1 \cdot c_1 \cdot \tan \gamma_1]}$$

and if  $\tan \gamma_1 = 0$  we get

$$\frac{q}{V_2/V_1} = 1$$

$$= 442 \times F. W. Lanchester's formula.$$

So that, under similar ideal conditions—

$$(\tan \gamma_1 = 0, q = 1, V_2/V_1 = 1)$$

we find that by making the inflow velocity constant over the blade we require only 442 times the brake horse-power required, to lift a given weight, as when using the "Rational" form of blade outline.



#### Fire at Brussels Aerodrome.

REPORTS received in Amsterdam from the Belgian border state that fire broke out on March 27th in a German military aerodrome at Berchem, near Brussels. Two Zeppelin sheds

are said to have been destroyed, but both were empty; a number of sheds containing Aviatik aeroplanes under repair were burned. The fire is said to have been started by three soldiers of the German garrison at Brussels. They disappeared when the fire broke out, probably deserting to Holland.

It is therefore obvious that for efficiency we require a blade form which is very wide near the boss and very narrow near the tips. Mr. Lanchester's condition of constant slip velocity is evidently an extremely sound one from the point of view of economy in brake horse-power/weight ratio.

Returning then to the efficiency formula for an airscrew, having constant  $(V_1)$  and  $(V_2/V_1)$  values, we may estimate the brake horse-power required and the weight/brake horse-power possible under similar conditions to those assumed by Mr. F. W. Lanchester in his estimate already given, but taking into account the fact that in practice  $(\tan \gamma_1)$  is always greater than zero, and hence we may expect a result similar to the one already given by Mr. F. W. Lanchester, but not so optimistic.

This result is continued by an investigation of the analysis already established. However, owing to the fact that it is impossible to eliminate the factor  $(c_1)$  from the expression for weight/brake horse-power ratio, an exact comparison between F. W. Lanchester's expression and the one obtained on this theory is impossible.

It is also possible from the formulæ for weight/brake horse-power already given to find the greater thrust possible with a given diameter propeller and given brake horse-power.

We can write:

$$\frac{W}{H} = 550 \cdot \frac{\sqrt{\left( 1 + \frac{V_2}{V_1} \right) \cdot A \cdot \rho}}{W} \text{ in lb. ft. sec. units.}$$

And putting

$$A = \frac{\pi}{4} \cdot d^2$$

$$\text{we get } W = (8 \cdot 27) \cdot \sqrt[3]{1 + \left( \frac{V_2}{V_1} \right) \cdot d^{2/3} \cdot H^{2/3}}$$

giving the equation required.

Thus, with a screw of 8 ft. diameter and actuated by 1 b.h.p., the total thrust would be 41.7 lbs. with  $(V_2/V_1)$  equal to 1, and 33.08 lbs. with  $(V_2/V_1)$  equal to zero.

In the September number of *Aeronautics*, 1911, the following figures are given for two screws tested by Professor W. H. Pickering, of Harvard:

B.H.P.	Diameter of Screw.	Thrust.
1	12 feet	48 lbs.
2	20 "	430 "

Applying the above formula for the two cases when  $(V_2/V_1)$  is equal to 1 and when  $(V_2/V_1)$  is equal to zero to the above figures, we get the thrust as calculated as given on the following table:

B.H.P.	Diameter of screw.	Calculated thrust.	$(V_2/V_1) = 1$	$(V_2/V_1) = 0$	Actual thrust.
(1) 1	12 feet	—	54.6 lbs.	43.3 lbs.	48 lbs.
(2) 20	"	—	565 "	448 "	430 "

These results appear to indicate that the purely theoretical formula established from R. E. Froude's theory is not so hopelessly out of agreement with the facts as often happens to be the case when dealing with ideal conceptions of this kind.

Further particulars regarding the form of Prof. Pickering's screws would have been interesting.

The formula here given for thrust is really only a variation of the one proposed by Mr. F. W. Lanchester in his paper "A Contribution to the Theory of Propulsion and the Screw Propeller" (Institution of Naval Architects, March, 1915).

where his coefficient  $(Q)$  has the value of:  $1 + \left( \frac{V_2}{V_1} \right)$  as given in this paper.

Probably a sufficiently approximate formula for the thrust delivered by a helicopter screw would be

$$W = K \cdot (8 \cdot 27) \cdot \sqrt[3]{1 + \left( \frac{V_2}{V_1} \right) \cdot d^{2/3} \cdot H^{2/3}}$$

where  $(K)$  depends upon blade form and may have an extreme value of unity. A graph of  $(W)$  against  $(d)$  is given in Fig. 7, for  $(V_2/V_1) = 1$ ,  $(K) = 1$ , and  $(H) = 1$ .

(To be concluded.)

are said to have been destroyed, but both were empty; a number of sheds containing Aviatik aeroplanes under repair were burned. The fire is said to have been started by three soldiers of the German garrison at Brussels. They disappeared when the fire broke out, probably deserting to Holland.

# The British Air Service

**Royal Naval Air Service.***Admiralty, March 27th.*

The following granted temp. commissions as Lieut., R.N.V.R., with seniority as stated : H. B. Hitch, April 4th; J. W. Taylor, W. H. Jones, L. E. Wear and W. E. Cutlan, Mar. 26th; and Air-Mech. H. J. W. Mullen, Mar. 23rd.

The following entered as Prob. Flight Officers, for temp. service, all to date : April 1st : B. Hackforth, H. R. Easyb, R. Sykes, J. E. Pugh, A. J. Binks, G. A. Haydock, J. C. Akester, F. W. Barton, W. M. Shoosmith, L. G. Morris, K. F. Piper, L. Martin, D. V. Carnegie, C. P. Porter, P. A. B. Tozer, C. S. W. Hall, Ord. Seaman (R.N.V.R.) J. M. Dawson and Pte. A. R. McAfee.

*Admiralty, March 29th.*

Temp. Sub-Lieut. (R.N.V.R.) E. B. C. Betts, D.S.C., promoted to Temp. Lieut., R.N.V.R., to date Feb. 28th.

*Admiralty, March 31st.*

L. Aitchison granted temp. commission as Lieut., R.N.V.R., and appointed to "President," for R.N.A.S., date Mar. 22nd.

W. A. Isaacs entered as Temp. Prob. Flight Officer, and appointed to "President," additional, for R.N.A.S., date Mar. 27th.

**Royal Flying Corps (Military Wing).***London Gazette, March 27th.*

**Flying Officers.**—Temp. 2nd Lieut. A. N. Kingwell, Gen. List ; Jan. 25th. 2nd Lieut. L. J. Mars, Yeo. (T.F.), and to be seed. ; Jan. 26th. Mar. 8th : Temp. 2nd Lieut. G. Stocks, High. L.I., and to be transfd. to Gen. List ; 2nd Lieut. (on prob.) T. W. Slater, Lond. R. (T.F.), and to be seed. ; Temp. 2nd Lieut. W. R. K. Skinner, Gen. List ; Temp. 2nd Lieut. H. T. Garrett, Gen. List.

**Flying Officers (Observers).**—Temp. 2nd Lieut. L. Gellatly, Gord. Highrs., and to be transfd. to Gen. List ; Mar. 3rd, seniority July 30th. 2nd Lieut. R. B. Davies, Northd. Fus. (T.F.) ; Mar. 8th, seniority Oct. 23rd. Temp. 2nd Lieut. T. C. Lowe, R.E. ; Mar. 9th, seniority Nov. 14th. Temp. 2nd Lieut. (on prob.) W. A. Golding, Gen. List ; Mar. 5th, seniority Nov. 18th. Temp. 2nd Lieut. (on prob.) T. W. George, Gen. List ; Mar. 9th, seniority Nov. 24th. Temp. Lieut. C. E. Williamson-Jones, Manch. R. ; Mar. 7th, seniority Dec. 29th. Temp. 2nd Lieut. (on prob.) C. E. Davies, Gen. List ; Mar. 8th, seniority Jan. 10th. Temp. 2nd Lieut. F. Higginbottom, Ches. R., and to be transfd. to Gen. List ; Mar. 9th, seniority Jan. 24th. The rank of Temp. 2nd Lieut. (on prob.) B. J. Venn, R.E., is as now described, and not as in the *Gazette* of Mar. 9th.

**Balloon Commander (graded as a Balloon Officer).**—2nd Lieut. J. A. Cochrane, R. Sc. Fus. (T.F.), from a Balloon Officer, and to be Temp. Lieut. whilst so employed ; Feb. 26th.

**Balloon Officers.**—Temp. Capt. A. G. T. Applin, Gen. List, from an Equipment Officer, 3rd Cl. ; Feb. 3rd. Feb. 28th : Lieut. T. G. Thornton, York. R. (T.F.), and to be seed. ; 2nd Lieut. (Temp. Lieut.) A. G. Church, R.G.A., S.R.

**Equipment Officers, 1st Class, and to be Temporary Captains whilst so employed.**—Mar. 14th : Temp. Lieut. W. J. C. Brown, Gen. List, from a Staff Lieut. ; 2nd Lieut. (Temp. Lieut.) L. Auker, Gen. List, from the 2nd Cl.

**2nd Class.**—Lieut. T. G. Skeats, R. Fus., S.R., from the 3rd Cl. ; Mar. 8th. 2nd Lieut. H. G. Gibbs, S.R., from the 3rd Cl., and to be Temp. Lieut. whilst so employed ; Mar. 14th.

**3rd Class.**—The appointment of the under-mentioned officers, notified in the *Gazette* of Feb. 27th, is antedated as follows : Temp. 2nd Lieut. (on prob.) A. G. D. West, Gen. List, to Nov. 29th ; 2nd Lieut. E. N. L. White, S.R., to Dec. 22nd.

**Experimental Officer, 3rd Class (graded as an Equipment Officer, 3rd Class).**—Temp. 2nd Lieut. (on prob.) L. C. H. Cave, Gen. List ; Mar. 6th.

**Memoranda.**—The under-mentioned to be Temp. 2nd Lieuts. (on prob.) for duty with R.F.C. : Petty Officer J. N. Hill, from R.N.A.S. ; Mar. 15th. 1st Cl. Air-Mech. M. B. Egan, from R.N.A.S. ; Mar. 19th.

**Supplementary to Regular Corps.**—The under-mentioned 2nd Lieuts. to be Lieuts. :—Mar. 1st : T. F. D. R. Aikman, D. Easdale, R. A. Logan, D. Cloete, M.C., F. McD. C. Turner, E. Graham, T. G. Holmes, W. H. Smith, R. A. Delhaye, A. E. Oxley, W. B. Sherwood, (Temp. Capt.) M. R. N. Jennings, P. F. W. Bush, R. Scott, R. G. Cookson. 2nd Lieut. G. E. Hewson resigns his commission on account of physical unfitness as a Pilot or Observer Mar. 28th.

*London Gazette Supplement, March 28th.*

**Flying Officers.**—Lieut. G. Cory-Wright, E. Kent R., S.R., from attd. E. Surrey R. (T.F.), and to be seed. ; Jan. 27th. Temp. 2nd Lieut. (Temp. Lieut.) C. G. Sturt, Gen. List ; Feb. 13th. Temp. 2nd Lieut. T. Webb, Gen. List ; Feb. 14th. Temp. 2nd Lieut. (on prob.) J. H. Flynn, Gen. List ; Feb. 27th. Feb. 28th : Capt. A. T. Greg, Ches. R., S.R., and to be seed. ; Temp. 2nd Lieut. C. C. Knight, attd. Dorset R., and to be transfd. to Gen. List ; 2nd Lieut. (on prob.) E. D. C. Herne, S.R. ; 2nd Lieut. (on prob.) D. U. McGregor, S.R. ; Temp. 2nd Lieut. E. G. Roberts, Gen. List. 2nd Lieut. W. K. Mercer, Gord. Highrs. (T.F.), and to be seed. ; Mar. 7th. Temp. Lieut. A. de Selincourt, N. Staff. R., and to be transfd. to Gen. List ; Mar. 8th. Temp. 2nd Lieut. P. Tew, Gen. List ; Mar. 9th.

**Adjutants.**—Temp. 2nd Lieut. W. O. Thomas, M.C., Gen. List, from a Flying Officer (Ob.), vice Temp. Lieut. A. Murray, Gen. List ; Feb. 10th. Lieut. E. N. E. Waldrone, Ind. Army Res. of Off., vice Capt. H. C. C. Morley, E. Kent R. ; Feb. 17th.

**Equipment Officers, 2nd Class.**—From the 3rd Cl., and to be Temp. Lieuts. whilst so employed :—Dec. 14th : 2nd Lieuts. S.R. : N. Martin, H. B. Dresser, S. Blackley, G. Urquhart, J. G. Wilson, A. Burgess, W. Sillem, L. Crooks, F. W. Elstob ; Temp. 2nd Lieut. M. F. W. Sampson, Gen. List. 2nd Lieut. H. J. Birtles, S.R. ; Feb. 1st. 2nd Lieut. P. M. Thesiger, Yeo. (T.F.), and to be seed. ; Mar. 1st. 2nd Lieut. A. J. M. Ross, S.R. ; Mar. 26th.

**3rd Class.**—2nd Lieut. (on prob.) V. A. B. Learoyd, S.R. ; Dec. 11th. Temp. 2nd Lieut. (on prob.) C. G. J. Silcock, Gen. List ; Dec. 15th. Temp. 2nd Lieut. (on prob.) W. H. Dowling, Gen. List ; Feb. 20th.

**Memoranda.**—The under-mentioned Temp. and Lieuts. are transfd. to Gen. List for duty with R.F.C. : H. S. Wilcox, attd. E. Kent R. ; Jan. 5th. W. Bruce, attd. Lpool. R. ; Jan. 6th. Sapper S. E. Barrett, from 2nd Can. Divl. Sig. Co., to be Temp. 2nd Lieut. (on prob.) for duty with R.F.C. ; Mar. 15th.

*London Gazette Supplement, March 29th.*

**Flight-Commanders.**—From Flying Officers : 2nd Lieut. (on prob.) B. H. E. Howard, M.C., Manch. R., S.R., and to be Temp. Capt. whilst so employed ; Dec. 24th. Temp. Capt. J. C. M. Hay, Gen. List ; Feb. 6th. Mar. 1st : Capt. J. T. Waller, Leic. R. And to be Temp. Capt. whilst so employed : Temp. Lieut. J. Morris, Gen. List ; 2nd Lieut. N. Kemsley, S.R. ; Lieut. K. L. Gopsill, E. Surr. R., S.R. ; Temp. Lieut. H. S. Paynter, Gen. List ; Temp. Lieut. S. G. Kingsley, Gen. List ; Lieut. S. F. Vincent, S.R. ; Temp. Lieut. F. J. Terrell, Gen. List ; 2nd Lieut. (Temp. Lieut.) W. R. S. Wilberforce, K. R. Rif. C. ; Lieut. G. Merton, S.R. ; Temp. Lieut. C. M. Gibson, Gen.

List ; Temp. Lieut. F. H. Furness-Williams, Gen. List ; Temp. Lieut. T. H. McDowell, Gen. List ; 2nd Lieut. (Temp. Lieut.) R. S. Lucy, Worc. R. (T.F.) ; Lieut. A. R. Johnston, High. L.I., S.R. ; Lieut. C. L. H. Hicks, S.R. ; Temp. Lieut. L. E. Whitehead, Gen. List ; and Lieuts. (Temp. Lieut.) J. McKelvie, R.E. (T.F.) ; Lieut. G. H. B. Stretefield, Durh. L.I., S.R. ; Lieut. P. Tremlett, S.R. ; 2nd Lieut. W. R. C. Dacosta, S.R.

**Flying Officers.**—Temp. 2nd Lieut. (on prob.) W. F. Macdonald, Gen. List ; Dec. 2nd. Feb. 17th : Lieut. W. V. Joslen, D. of Corn. L.I., S.R., and to be seed. ; 2nd Lieut. R. L. Thomas, Welsh R. (T.F.), and to be seed. Temp. 2nd Lieut. H. R. Poole, Northd. Fus., and to be transfd. to Gen. List ; Feb. 18th. Temp. 2nd Lieut. H. B. Evans, Gen. List ; Feb. 28th. Temp. Lieut. M. J. Thurston, Gen. List ; Mar. 2nd. 2nd Lieut. F. Farmer, Gen. List : Mar. 3rd. 2nd Lieut. C. Reece, Ches. R. (T.F.), and to be seed. ; Mar. 9th. Mar. 10th : Temp. 2nd Lieut. P. Lunt, R. W. Fus., and to be transfd. to Gen. List ; 2nd Lieut. (Temp. Lieut.) D. Cairns, Cyclist Bn. (T.F.), and to be seed. Temp. 2nd Lieut. J. S. Leslie, Gen. List. Temp. 2nd Lieut. H. S. Blakeley, attd. R. Suss. R., and to be transfd. to Gen. List ; Mar. 12th.

**Equipment Officer, 2nd Class.**—2nd Lieut. J. J. Botterill, S.R., from the 3rd Cl., and to be Temp. Lieut. whilst so employed ; Mar. 1st.

**Memoranda.**—Sergt. F. H. Beer, from R.F.C., to be Temp. 2nd Lieut. (on prob.) for duty with R.F.C. ; Mar. 12th. The under-mentioned, from R.F.C., to be Temp. 2nd Lieuts. for duty with R.F.C. :—Mar. 14th : Flight-Sergt. A. V. Boothroyd, Actg. Sergt. R. E. Cook, Actg. Corp. G. T. Bickerton, Sergt. E. A. Smith, 1st Cl. Air-Mech. R. Wilson, Sergt. E. Plimley. The under-mentioned 2nd Cl. Air Mechanics, from R.F.C., to be Temp. 2nd Lieuts. for duty with R.F.C. :—Mar. 14th : B. D. Bate, R. W. Jefferson, L. R. W. Loyd, H. S. Hollings and G. Newlett.

*London Gazette, March 30th.*

**Special Appointments.**—**Graded for Pay as Staff Lieutenant, 3rd Class.**—Feb. 26th : Temp. 2nd Lieut. (on prob.) L. Waight, R.F.C.

**Flight-Commanders.**—From Flying Officers, and to be Temp. Capts. whilst so employed : Temp. 2nd Lieut. (Temp. Lieut.) L. S. Ward-Price, Res. R. of Household Cav. ; Mar. 14th. Mar. 21st : 2nd Lieut. (Temp. Lieut.) C. E. M. Pickthorn, A.S.C., S.R. ; 2nd Lieut. F. H. B. Selous, R.W. Surr. R. Temp. Lieut. B. C. Rice, Gen. List ; Mar. 24th.

**Flying Officers.**—Jan. 12th : 2nd Lieut. G. P. Kay, S.R. ; Temp. 2nd Lieut. N. H. Dimmock, Gen. List. 2nd Lieut. (Temp. Lieut.) K. W. McDonald, R.E. (T.F.), and to be seed. ; Jan. 24th. Temp. 2nd Lieut. (on prob.) W. H. Gunner, Gen. List ; Feb. 3rd. 2nd Lieut. C. S. Gaskain, R.F.A. (T.F.) ; Feb. 27th. 2nd Lieut. A. M. de Lavison, Lond. R. (T.F.), and to be seed. ; Mar. 3rd. Temp. 2nd Lieut. (on prob.) J. Toogood, attd. Norf. R., and to be transfd. to Gen. List ; Mar. 6th. Temp. Lieut. R. E. Duke, Gen. List from a Flying Officer (Ob.) ; Mar. 9th, 1917, seniority May 13th, 1916. Mar. 12th : 2nd Lieut. D. P. McDonald, Yeo. (T.F.), and to be seed. ; 2nd Lieut. J. H. S. Green, Newfoundland R. 2nd Lieut. (on prob.) C. M. de Roche, S.R. ; Mar. 13th.

**Balloon Commander (graded as a Balloon Officer).**—Lieut. T. G. Thornton, York. R. (T.F.), from a Balloon Officer ; Mar. 12th.

**Park Commanders.**—2nd Lieut. (Temp. Capt.) S. S. Kennedy, S.R., from an Equipment Officer, 1st Cl., and to be Temp. Major whilst so employed ; Mar. 1st. Capt. G. Adams, S. Lan. R., from a Flight-Com., and to be Temp. Major whilst so employed ; Mar. 14th.

**Equipment Officers, 1st Class.**—From the 2nd Cl., and to be Temp. Capts. whilst so employed : Lieut. L. A. McDougald, S.R. ; Jan. 29th. Mar. 1st : 2nd Lieut. (Temp. Lieut.) C. F. J. North, S.R. ; 2nd Lieut. (Temp. Lieut.) J. N. D. Heenan, S.R. Temp. Hon. Lieut. W. E. Reason, Gen. List, and to be Temp. Capt. whilst so employed ; Mar. 14th.

**2nd Class.**—2nd Lieut. (on prob.) G. J. C. Gunn, Sco. Rif., S.R., and to be Temp. Lieut. whilst so employed ; Jan. 25th. (Substituted for the notification in the *Gazette* of Feb. 6th.) Temp. Hon. Lieut. A. Chapman, Gen. List, and to be Temp. Lieut. whilst so employed ; Mar. 14th.

**3rd Class.**—2nd Lieut. (on prob.) E. H. Wilding, S.R. ; Jan. 8th. Temp. 2nd Lieut. J. E. Hall, Gen. List ; Feb. 20th. 2nd Lieut. G. F. Felstead, Gen. List ; Feb. 10th. 2nd Lieut. A. W. Turner, Gen. List ; Mar. 3rd. Temp. 2nd Lieuts., Gen. List : B. D. Bate, G. Hewlett, H. S. Hollings, R. W. Jefferson and L. R. W. Loyd ; Mar. 14th.

**Memoranda.**—To be Temp. Capt. : Lieut. H. G. Southon, from R.N.V.R., for duty with R.F.C. ; Jan. 30th. The under-mentioned to be Temp. Lieuts. whilst serving with R.F.C. :—Mar. 1st : 2nd Lieuts. : D. H. Bell, M.C., Cann. Highrs. ; F. L. Carter, E. Surr. R. ; C. R. Keary, N. Staff. R. ; A. N. G. Summers, Lrs. ; H. C. Bankart, Middx. R. S.R. ; R. C. Hardie, D. of Corn. L.I., S.R. ; F. K. Laverton, Glouc. R. S.R. ; F. S. Wilkins, R.G.A., S.R. ; C. H. Beldam, Camb. R. (T.F.) ; H. C. Benstead, N. Staff. R. (T.F.) ; G. S. Bozman, R. W. Surr. R. (T.F.) ; D. C. Cunnell, Hamps. R. (T.F.) ; W. E. Dawson, R.F.A. (T.F.) ; C. R. Dougall, Arg. and Suthd. Highrs. (T.F.) ; H. Forrest, R.F.A. (T.F.) ; W. E. Holland, Yeo. (T.F.) ; P. Pike, Devon. R. (T.F.) ; W. J. Potts, R.F.A. (T.F.) ; S. S. B. Purves, Yeo. (T.F.) ; R. H. Rayner, W. Rid. R. (T.F.) ; R. H. Soundy, Lond. R. (T.F.) ; T. Thomson, Arg. and Suthd. Highrs. (T.F.) ; T. Ure, Sco. Rif. (T.F.) Temp. and Lieuts. : R. A. Wingfield, R. Ir. Fus. ; J. E. Addinsell, F. Beaumont, J. H. Forbes, R. Gregory, D. B. King, J. E. S. Long, P. A. McGuinness, A. P. Matheson, H. M. Over, D. K. Paris, M.C., L. P. Rendell, W. H. Rilett, H. G. H. Stewart, T. S. Stewart and W. J. Tempest, D.S.O. Actg. Sergt.-Major W. H. Harrison, from R.F.C., to be 2nd Lieut., for duty with R.F.C. ; Mar. 14th.

**Supplementary to Regular Corps.**—The under-mentioned 2nd Lieuts. (on prob.) are confirmed in their rank : D. U. McGregor, G. P. Kay, V. A. B. Learoyd, C. R. Sloan, A. C. Truelove. W. R. Kells to be 2nd Lieut. (on prob.) : Mar. 15th.

*London Gazette Supplement, March 31st.*

**Squadron Commanders, from Flight-Commanders, and to be Temporary Majors whilst so employed.**—Capt. J. L. Jackson, M.C., Conn. Rang., S.R. ; Oct. 2nd. 2nd Lieut. (Temp. Capt.) W. H. D. Acland, M.C., Yeo. (T.F.) ; Dec. 1st. 2nd Lieut. (Temp. Capt.) H. S. Shield, M.C., N. Staff. R. ; Jan. 7th. 2nd Lieut. (Temp. Capt.) the Hon. O. M. Guest, Yeo. (T.F.) ; Jan. 25th.

**Supplementary to Regular Corps.**—2nd Lieut. (on prob.) P. S. Whitmore relinquishes his commission on account of physical unfitness as a Pilot ; April 1st.

**Royal Flying Corps (Territorial Force)***London Gazette Supplement, March 26th.*

Capt. J. E. Pearce to be Temp. Major ; Feb. 1st.

**Aeronautical Inspection Department.***London Gazette, March 30th.*

Temp. 2nd Lieut. (on prob.) L. Eynon from R.E., to be Temp. Lieut. on Gen. List (without Army pay or allowances) whilst employed as an Assistant Inspector, A.I.D. ; Mar. 1st.

# AIRCRAFT WORK AT THE FRONT.

## OFFICIAL INFORMATION.

**British.***General Headquarters, March 25th.*

"There was considerable activity in the air yesterday by both sides. Two important railway junctions behind the enemy's lines were bombed by our aeroplanes, and a number of fights took place, in the course of which eight hostile machines were driven down out of control. Four of our machines are missing."

*General Headquarters, March 26th.*

"There was much fighting in the air yesterday, in the course of which two German machines were brought down and three others driven down damaged. Seven of our machines are missing."

*General Headquarters, March 29th.*

"Two German aeroplanes were driven down in a damaged condition yesterday, as a result of fighting in the air. Three of our machines are missing."

*War Office, March 30th.*

"*Salonica.*—Our aircraft have been active, and on one occasion drove off an enemy squadron which was endeavouring to carry out a bombing attack on our communications."

*General Headquarters, March 31st.*

"Successful work was carried out by our aeroplanes yesterday in spite of unfavourable weather. One hostile machine was driven down out of control. Two of our machines are missing."

*General Headquarters, April 1st.*

"There was considerable activity in the air yesterday, and a number of fights took place. Two German aeroplanes were destroyed and three others driven down. One of our machines is missing."

**French.***Paris, March 26th.*

"Yesterday five German machines were brought down by our pilots. Warrant Officer Ortoli brought down two, thus bringing the number of enemy aeroplanes destroyed up to now by this warrant officer to eight. Last night one of our air squadrons dropped 1,000 kilogrammes (a ton) of bombs on the factories of Thionville and of the Briey Basin, and on the railway stations of Conflans and Montmedy."

*Paris, March 27th.*

"*Salonica.*—There was great aerial activity on the whole front. A German aeroplane was brought down near Prespa Lake. The pilot and observer were made prisoners."

*Paris, March 29th.*

"Yesterday a German aeroplane was felled in an air fight by one of our pilots."

*Paris, March 31st.*

"German aeroplanes dropped bombs yesterday evening in the vicinity of Dunkirk. Two persons belonging to the civilian population were killed and three wounded."

*Paris, April 1st.*

"Notwithstanding the bad weather which has prevailed along the front, our pilots have during the week been engaged in numerous aerial battles, and have destroyed seven German machines. The fighting has enabled Lieut. Dorn to bring up to 18 the number of hostile aeroplanes which he has felled. Capt. Doumer and Sergt. Casale have each brought down their seventh adversary, and Capt. Matton has scored his fifth victory."

**Russian.***Petrograd, March 22nd.*

"*Roumanian Front.*—In the direction of Focșany the enemy is displaying intense aerial and artillery activity."

*Petrograd, March 23rd.*

"German aeroplanes have dropped bombs on Galatz."

*Petrograd, March 24th.*

"South-west of Dvinsk one of our machines attacked an enemy aeroplane. After machine-gun fire on both sides the two machines landed rapidly within the enemy's lines east of Novo Alexandrovsk."

*Petrograd, March 26th.*

"North-west of Smorgon our artillery hit a German aeroplane, which fell into the enemy's lines."

*Petrograd, March 27th.*

"In the region of the little town of Svoltchi (east of Baranovitchi) and north-west of Kimpolung, two enemy aeroplanes were hit by our fire and fell into our lines. The aviators were taken prisoners."

*Petrograd, March 28th.*

"Detachments of our seaplanes made a raid on Berkos (Pyrgos), 26½ miles north-west of Constantinople, and dropped 50 bombs on the aqueduct which supplies Constantinople with water. The same day another detachment of our seaplanes made a raid on Tultcha and dropped bombs there."

*Petrograd, March 30th.*

"*Roumanian Front.*—In the region of Bourka (23½ miles north of Toxany) our artillery brought down a German aeroplane."

*Petrograd, April 1st.*

"An enemy airship was burnt as the result of attacks by our aeroplanes and gunfire in the region of Odobesci."

"A squadron of our aeroplanes, consisting of 22 machines, made a raid on Braila. Bombs were dropped on the pier, the docks and the stores, causing great fires. Harassed by our aeroplanes, the boats left Braila and sailed up the Danube."

**Italian.***Rome, March 19th.*

"The fine weather prevailing was favourable to aircraft, and after a brisk fight we brought down two enemy aeroplanes, one of which fell within our lines. Last night one of our airships, in spite of a strong headwind, succeeded in dropping a ton of high explosives on the railway station of Galliano (Lagarina Valley), and on the railway line to the north in the direction of Mattarello, with good results. The airship escaped from the heavy fire of anti-aircraft artillery, and returned safely. A squadron of enemy seaplanes dropped bombs on the lagoon of Grado, but there were no casualties, and very slight damage was done."

"Our seaplanes carried out reconnoitring and offensive operations against the Austrian naval port of Pola, dropping bombs on the arsenal there. Five enemy aeroplanes, escorted by destroyers, ascended to counter-attack, and after an aerial engagement, were repulsed by French aeroplanes which were supporting our own."

"This morning, a little before daybreak, a squadron of enemy seaplanes dropped bombs on Grado and the coastal zone to the east of Grado. The damage done was insignificant, and there were no casualties. Immediately afterwards a squadron of our seaplanes bombarded the Lloyd shipyards at Muggia, near Trieste. All the Italian and Allied machines returned to their bases."

*Rome, March 20th.*

"Numerous air encounters took place. We brought down an enemy aeroplane on the Asiago Plateau, the airmen being taken prisoners."

*Rome, March 21st.*

"An enemy aeroplane was brought down in flames by our fire in the vicinity of Lokvica; the airmen were killed."

*Rome, March 29th.*

"Hostile aircraft dropped bombs on Gorizia, but we suffered no casualties."

**Roumanian.***Jassy, March 21st.*

"Reconnoitring enemy airmen dropped a number of bombs upon our munitions depôts."

**German.***Berlin, March 20th.*

"During aerial engagements 13 enemy aeroplanes were brought down, two by anti-aircraft guns."

*Berlin, March 21st.*

"*Balkans.*—In the Tcherna bend our artillery fire brought down a captive balloon in flames."

*Berlin, March 22nd.*

"The aeroplane piloted by Prince Friedrich Karl of Prussia, which went for a flight over the enemy lines between Arras and Peronne, has not returned."

"Three enemy aeroplanes have been shot down."

*Berlin, March 23rd.*

"One of our airships, on the night of the 20th, effectively bombed British establishments near Mudros, on the island of Lemnos. It returned unscathed."

*Berlin, March 25th.*

"Between the sea and the Moselle our aeroplanes made numerous attacks against enemy machines and objectives on the ground. During aerial engagements the British and French lost 17 machines."

"Senior Lieutenant Baron von Richthofen brought down his 30th opponent and Lieutenant Voss his 16th and 17th."

*Berlin, March 26th.*

"In the evening of March 24th an air squadron attacked Dunkirk. Several fires were observed. Yesterday the enemy lost eleven machines in aerial combats."

"*Balkans.*—Bombs dropped by our aviators on enemy camps near Snevce, to the south-east of Lake Doiran, had very good effects."

*Berlin, March 29th.*

"At one point, as the result of a counter-thrust to the east of Verdun, our aviators brought down two captive balloons."

Four hostile aeroplanes were brought down in air engagements and by our anti-aircraft guns."

Berlin, April 1st.

"Macedonian Front.—The position is unchanged. Our aviators brought down two captive balloons in flames, and dropped bombs effectively upon troop camps in the Cerna bend."

Austrian.

Vienna, March 19th.

"On the coastal front there has been lively aerial activity and also lively gunfire at times. In the Etach Valley several places were shelled by an enemy airship."

Vienna, March 20th.

"Trieste was recently the objective of enemy aerial bombs."

Bulgarian.

Sofia, March 13th.

"On the whole front there is aerial activity on both sides.

## ■ ■ SIDE-WINDS. ■ ■

Now that the Oxy-Acetylene process of welding and cutting metals has become such an essential part of aircraft workshop practice, the choice of a suitable plant is a matter of considerable importance, and as there are now several really first-class outfits on the market, it is not always easy to pick the most suitable for any given conditions. For the guidance of those contemplating the purchase of an Oxy-Acetylene plant, it may be pointed out that Messrs. Carbic, Ltd., of 51, Holborn Viaduct, E.C.1, are producing a very neat plant, which has the advantage of being extremely portable (a 50 cub. ft. plant can be carried, when fully charged, by two men), while possessing the following desirable characteristics:—The temperature at the point of generation is low, thus reducing the chance of impurities forming. The acetylene is absolutely cool when delivered to the blowpipe, and the gas is thoroughly washed and passed through a chemical purifier, which rids it of sulphur and phosphorous compounds. Finally, the gas supply is constant, and at an invariable pressure.

In this system the gas is generated from what is known as Carbic cakes, which are composed of specially-prepared carbide compressed into cylindrical cakes. The makers claim that by using these cakes, the generation of gas is completely under control, and over-generation and consequent waste prevented. We understand that over 200 firms are now using Carbic Oxy-Acetylene welding plants, one firm having installed over 100 plants.

LIGHT and heavy webbings and tapes are amongst the things in constant demand where the manufacture of aeroplanes is taking place, as is also spindle bindings, linen thread webs, cotton tapes, hemp cords and similar goods. Long experience in the technique of making of these goods has placed James Carr and Sons, Ltd., of Clarence Mills, Manchester, in the front rank of producers, and manufacturers of aircraft may rely on getting the value of that experience in their purchases from the firm. They are contractors to the Government, and their London office is at 34, Noble Street, E.C.2.

ONE hundred and forty years ago aircraft science had not made much headway, but colours, which now, by the way, assist our flyers to distinguish friend from foe, were apparently well in evidence for other purposes. We were not on hand at the time, but have been led to these reflections by noticing the establishment date of one of the very old British colour and varnish making firms, Joseph Freeman, Sons and Co., Ltd., of Wandsworth.

Nearly a century and a half's existence finds the above-mentioned firm still hard at it and marching with the times, producing their preparations of paint, colour and varnish necessary to the equipment of up-to-date aeroplane manufacturers.

A recent visit to their works disclosed a hive of industry, men and women vieing with each other in endeavouring to secure the greatest output to help the boys in blue and khaki, the principals being well to the fore in their efforts.

SOMETHING apparently new in glue is now being manufactured by the British and Russian Commercial Co., Ltd., of 65, Bishopsgate, E.C. It is the invention of a Russian, and some of the most important advantages claimed for it are that it is insoluble in hot or cold water, that the preparation can be mixed just as and when required, and that, if necessary, half an hour can be allowed to elapse before bringing the glued surfaces together without losing any of its adhesiveness.

It is said to stand well the A.I.D. test for plywood, which consists of soaking the glued parts in water at a temperature of 110° F. to 120° F., without showing any signs of the joints parting.

Near Miletkovo a British aeroplane was brought down in an aerial fight."

Sofia, March 21st.

"There has been lively aerial activity in the valleys of the Vardar and the Struma."

Sofia, March 25th.

"In the Vardar Valley and the Drama region lively air activity."

Turkish.

Constantinople, March 30th.  
"One of our land aeroplanes pursued over the Black Sea for 50 miles fleeing enemy aeroplanes, and by machine gun fire compelled two of them to descend into the sea."

"Sinai Peninsula.—Our aviators report that numerous British transport columns are retreating towards the southwest."

## ■ ■

It is also claimed that it is more economical than Scotch glue, and appears altogether to be worth the trouble of testing by those engaged in aeroplane manufacture.

REORGANISATION of the Thomas Bros. Aeroplane Co. and the Thomas Aeromotor Co., of Ithaca, N.Y., has brought the two businesses under one administration, which in future will be known as the Thomas-Morse Aircraft Corporation. Both sides of the company will carry on as before, except that greater efficiency is looked for as a result of the intimate co-operation between the aeroplane and motor departments in working out new designs. The motor department has now moved into a new concrete steel building, where a number of up-to-date machine tools have been added to the original equipment. The aeroplane department will shortly move into fresh quarters, where building can be carried out with efficiency.

Long cross-country flights have demonstrated the efficiency and reliability of the Thomas 8-cylinder motor, and the new motor of 150 h.p. with reduction gear drive weighs 80 lbs. less than the 135 h.p. unit, while preliminary runs have showed a brake horse-power of 156. The manufacture of this model will shortly be on a quantity production basis.

The Thomas-Morse Aircraft Corporation is now prepared, we understand, to guarantee production on a very much larger scale than was possible in the past, and orders now on the books will keep the factory working at full bore until September. In addition to these new types are being worked out, but nothing can be said on the matter for the present.

MESSRS. LUCRAFT AND WESTCOTT, LTD., the propeller specialists of Rushton Street, New North Road, have now moved into a large and more convenient factory. All communications should in future be addressed to them at Albert Works, Albert Road, Wood Green, London, N.22. The telephone number at their new headquarters is Hornsey 1807.

ALTHOUGH the weather has been distinctly unfavourable, a good deal of work has been put in by the pupils at the Wells Flying School at Cobnor, and under Mr. Virgilio's guidance have been obtaining some valuable weather experience. One advantage of the school is that it has good facilities in the way of cross-country flying.

THOSE who are on the lookout for turnbuttons should make a note of the fact that the Press-Work Branch of the Apollo Manufacturing Co. is now turning out very large quantities of these articles for aircraft work. Moreover the firm are, we understand, in the favourable position of being able to offer immediate deliveries. Full details as to prices can be obtained from the Apollo Manufacturing Co., Apollo Works, Birmingham.

"COAN casts clean crank cases" and other things useful from the aviation and motoring point of view, but he also is always ready to do a good turn to his fellow men. Thus the Executive Committee of the King's Cross Philanthropic Society, of which he is President, recently entertained him in recognition of his services to forward the cause of the Society during the 25 years he has been connected with it. In expressing the appreciation of the Society for the excellent work done by Mr. Coan, and the many kindnesses they had received at his hands, Mr. H. J. Goss, who took the chair, said that many of the most successful features of the Society's administration to-day were due to Mr. Coan's liberal and far-sighted judgment. Needless to say, they hoped to have Mr. Coan's help for many years to come. After the dinner the whole party adjourned to a theatre.

**The Struggle for Air Supremacy.**

ONLY once since the beginning of the Battle of the Somme, it is noted in the *Times* of April 3rd, have the monthly losses of aeroplanes on the Western Front exceeded those which were officially recorded in March. That was in September, when the figure for the French, the Germans, and ourselves was 322. Last month the losses numbered 262, made up as follows: British (acknowledged by General Headquarters in France), 58; French (on the assumption that the German reports are trustworthy), 71; German (based on the British and French daily *communiqués*), 133.

British airmen accounted for 84 German machines, and these were officially classified as follows: Destroyed, 14; driven down, damaged, 34, and out of control, 11; brought down, 22; fell in our lines, 3. Of the 58 British machines, eight were brought down in air fights or by anti-aircraft guns, and 50 were returned as "missing." The 84 to 58, compared with 41 to 23 in February, 41 to 15 in January, 35 to 10 in December, and 57 to 32 in November. In September of 1916 the proportion was at least 100 to 48, and of the 100, 53 were specifically reported as having been destroyed.

The French secured 49 German aeroplanes, which were reported in the following categories: Destroyed, 10; fell in French lines, 4; brought down in air fights, 27; by anti-aircraft fire, 7; captured, 1.

German Main Headquarters, for the first time, acknowledged losses in its daily reports. But the admissions were obviously only intended to magnify their successes, and cannot be taken seriously. Here they are—with the other side of the shield as presented by the British and French reports: March 4th: German claim, 18, admitted loss, 4; British and French claim, 17 German machines. March 6th: German claim, 15, admitted loss, 1; British and French claim at least 7. March 16th to 17th: German claim, 22, admitted loss, 3; British and French claim, 30.

Several new French airmen won official recognition during the month—Lieutenant Piussard, who brought down a "Rampler" (the first German machine of this name recorded); Adjudant Douchy, Adjudant Ortoli, who, first named on March 23rd for his fifth victory, had, by March 25th, brought down his sixth, seventh, and eighth German machines, and Captain Matton. The veteran Guynemer still keeps pride of place. With a triple victory on March 16th, followed by a "single" the next day, he has now 35 enemy aeroplanes to his credit. Two new names appeared in the German reports Lieutenant Baltamus, who was suddenly thrust on public notice on March 17th as the winner of 15 victories, and Lieutenant Voss, who, though never officially mentioned before March 24th, was declared to be the hero of 17 fights.

**Zeppelin Souvenirs.**

CHARGED before the magistrates on March 31st with being in possession of certain parts of a Zeppelin that fell near his cottage on September 24th last, an Essex ploughman said the portions of girders and window frames were given him by men who cleared the Zeppelin away. He found the Zeppelin speedometer in a field four months after the airship fell. The case was dismissed, the bench considering that defendant had no guilty knowledge.

The defendant's request that he might retain the aluminium fragments in memory of the Germans who called at his cottage was not granted.

**Slack Aeroplane Workers.**

FINES of 10s. each were imposed on two well-dressed young men who appeared before the London Munitions Tribunal for losing time, when engaged on urgent aeroplane work. It was stated that during their absence they had been seen at a concert, one of them taking part in the performance.

**A Fire at Brooklands.**

THE famous "Bluebird" canteen at Brooklands, together with a number of hangars adjoining, were destroyed by fire on March 28th. The work of the firemen prevented the fire spreading to the workshops, and practically all aeroplanes were saved.

**King Albert Flies.**

THE Belgian newspaper *La Metropole*, now published in London, learns from Flanders that on March 18th King Albert, who was visiting a new military flying ground of the Belgian Army, expressed a desire to act as observing officer in an aerial reconnaissance. His Majesty accordingly took his seat in a two-seater piloted by the Belgian officer, Capt. Jacquet, who has accounted for several German machines. Preceded by a squadron of fighting planes, the King flew over the whole length of the Belgian Yser front at heights varying between 3,000 ft. and 6,000 ft., making numerous observations, and taking several photographs. It is stated

that the German anti-aircraft guns put up a well-sustained fire, but no enemy was encountered by the Royal plane, which effected a smooth landing at the appointed place, the King afterwards discussing his observations with the General Staff.

**American Manufacturers Form Association.**

ONE result of the American Show was the formation of the American Association of Aircraft Manufacturers. The fifteen companies represented at the inaugural meeting were the International Aircraft Co., the Burgess Co., the Curtiss Aeroplane and Motor Corporation, the Thomas Morse Aircraft Co., the F. H. Flint Engineering Co., the United Eastern Aeroplane Co., the Gallaudet Aircraft Corporation, the Brook Aircraft Co., the General Aeroplane Co., the American Motorplane Co., the John D. Cooper Aeroplane Co., the A. S. Heinrich Corporation, the Standard Aero Corporation, the S. S. Pierce Aero Corporation, and the Benoist Corporation. The combined output of these firms is given as 175 machines per week, and the Association has decided to place all its resources at the command of President Wilson.

**PUBLICATIONS RECEIVED.**

*The "Daily Telegraph" Postal Map of London.* By Alexander Gross, F.R.G.S. London: Geographia, Ltd., 55, Fleet Street. Price 1s. net; cloth, 2s. 6d. net.

*The Properties of Aerofoils and Aerodynamic Bodies.* By A. W. Judge, A.R.C.Sc. London: Whittaker and Co. Price 15s. net (postage 6d.).

**NEW COMPANIES REGISTERED.**

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METEOR MANUFACTURING CO., LTD., 72, Gray's Inn Road, W.C.—Capital £3,000, in 2,950 preference shares of £1 each and 1,000 ordinary shares of 1s. each. Acquiring business carried on by Carl Opperman, as the Meteor Manufacturing Co. at 72, Gray's Inn Road, W.C., mechanical, aero and motor engineers, &c.

READ AND BRENNAND, LTD., Obelisk Works, St. George's Circus, S.E.—Capital £500, in £1 shares. Manufacturers of and dealers in aircraft of all kinds, general engineers, &c. First directors: J. V. Read and F. H. Brennand.

**Aeronautical Patents Published.****Applied for in 1916.**

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